The Engineering and Mining Journal

WITH WHICH IS CONSOLIDATED "MINING AND METALLURGY."

VOL. LXXVIII. NEW YORK, THURSDAY, OCTOBER 13, 1904. No. 15.

THE ENGINEERING AND MINING JOURNAL. ESTABLISHED 1866

PUBLISHED EVERY THURSDAY

261 BROADWAY, NEW YORK.

TELEPHONE 6865 CORTLAND P. O. BOX 1833.
CABLE ADDRESS "ENGMINJOUR" NEW YORK.

T. A. RICKARD . . . . . EDITOR

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THE ENGINEERING AND MINING JOURNAL.

Entered at New York Post Office as 2nd Class matter,

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EDITORIAL.

THE MOVEMENT OF iron ore down the Lakes is increasing as the season draws towards its close. Shipments have been larger recently, and at some of the big Mesabi mines an effort is being made to clean up the stock-piles before navigation ceases. This is partly due to the fact that the demand for ore during the coming winter promises to be larger than was expected two or three months ago. A number of furnaces have been blown in, and managers of the iron ore properties evidently do not want to close the season with a short stock on the lower lake docks, when there is a possibility of a demand arising during the winter.

THE STRIKE of the Alabama coal miners still continues, but the present prospect is that it will finally fail. The number of mines in operation is increasing, and the iron companies seem to be no longer embarrassed by fuel shortage. The strike had no substantial basis, or grievances to justify it, and seems to be gradually losing support. Under the old schedule the miners earned last year more than they ever did before, and the present lower prices of iron would have caused only a moderate reduction in wages.

CRIPPLE CREEK has apparently recovered from the effects of recent labor troubles, and is now making excellent progress in mining development. Several new discoveries give assurance of contributing largely to the output of the district, the chief increase in activity being on Beacon hill, where the Lanoconning vein, found on the hillside below the Orizaba and El Paso workings, is now richly productive. This discovery has stimulated exploration for the extension of the known orebodies, and promises to make Beacon hill more important than it has ever been, while giving more spirit to all exploratory work in the Cripple Creek region.

A CORRESPONDENT, on another page, calls attention to the discrepancy existing between the current price of spelter and that of zinc ore in the Joplin district. Undoubtedly the present situation can hardly last, since the smelters cannot continue to pay the high prices for zinc ore, unless there is a material advance in the price

of metal. The latter does not seem probable. The demand for spelter, both here and abroad, is good, but high prices would certainly check sales, since the call is not so imperative that purchases cannot be postponed. At present, most of the Missouri and Kansas smelters are not ready to use western ores; but they will probably make arrangements to do so if the present shortage and high prices of Joplin ores continue.

ON ANOTHER page we publish a letter from Mr. Beardsley dealing with pyrite smelting and touching upon one or two matters connected with that process in an illuminating manner. That the slag of the pyrite furnace is self-selected has been noted previously, but no adequate explanation has been offered. The behavior of alumina is another point worthy of emphasis; in ordinary reduction smelting no difficulty is found in making slags with 15 or even 20 per cent alumina, in the presence, of course, of a large quantity of coke; but in pyrite smelting it appears that on account of the low formation temperature of slag, but little of this substance can be assimilated. The study of slag-formation temperatures—a phrase used by Hofman—is a subject deserving of more attention, and we invite our metallurgical friends to express their views.

ON ANOTHER page we publish an earnest protest by a writer known to be trustworthy against the mismanagement of Le Roi mine. It is, indeed, a matter for regret that this splendid mine should have become, by Whitaker Wright's manipulation and by later occurrences, a discredit to British Columbia instead of the bright and particular star in the mining activities of that Province. We are not at all satisfied that the hasty condemnation of Mr. S. F. Parrish—who was the victim of circumstances, one of which was a severe illness, and another the wretched methods of sampling—explained the confused condition of Le Roi affairs, and we hope that the shareholders in London will take pains to get adequate professional advice before committing themselves to any new policy.

THERE IS a good deal of activity in prospecting for tin in the region between Bessemer City and Gaffney, crossing the boundary between the States of North and South Carolina. The American Tin Plate Company has taken an option on 5,000 acres and has started exploratory work. The small shipments of tin made from the shallow workings at Gaffney are said to have been profitable. Most of the product is stream tin imbedded in clay, but some of it is in place, as a decomposed lodestuff. The occurrence is irregular and superficial, as far as has been determined, so that there has been no great encouragement for operations on a large scale.

THE CEMENT industry in America and Europe is in the peculiar position of trying to rehabilitate prices by curtailing the output of so-called combination plants, while the independents, who are increasing in number, combat this policy, anticipating a revival in consumption. In Germany the recently organized syndicate is considering a readjustment of its price-schedule; in Great Britain, Belgium and France, improvements in manufacture are receiving increased attention, and in the United States, where the market has been demoralized by competition, an energetic propaganda of the new uses found for cement is being carried on, at the expense of the larger manufacturers. The export trade of all the European countries has suffered severely by the relaxation in demand from America—the largest consumer in the world. American manufacturers, on the other hand, are cultivating a substantial foreign business, and so far this year exports have doubled, while imports have fallen off greatly. Evantually America will occupy a unique place in the world's cement industry.

LEAD PRODUCTION.

The production of lead in the United States in 1903, from domestic ores, showed a slight decrease from that reported in the previous year. The total, as shown by the figures furnished for 'The Mineral Industry' by producers, was 276,694 short tons, and the decrease from 1902 was 3,830 tons, or 1.3 per cent. The decline in production was entirely in desilverized lead, the output of soft lead, chiefly from the Missouri mines, showing a gain of 11 per cent. The causes for this change have been referred to heretofore in our columns. During part of the year the smelters restricted their purchases of ore and consequently the production of the metal.

In addition to the lead made from domestic ores, smelters and refineries turned out 92,794 tons of metal from foreign ores and base bullion, making the total lead put into merchantable form, at works in the United States, 369,488 short tons.

As the movement of foreign lead has a considerable influence upon our market, we give, in the table below, a statement of the imports, exports, etc., as shown by the reports of the Bureau of Statistics, the figures being in short tons:

Foreign Lead in the United States.

Imports.	1902.	1903.	Changes.
Lead, metallic	2,529	3,023 I.	494
Lead in ores and base bullion	105,186	103,384 D.	1,802
Total imports	107,715	106,407 D.	1,308
Less re-exports of foreign	78,967	81,915 I.	2,948
Less smelters' allowance on lead re-exported	7,897	8,192 I.	295
Total deductions	86,864	90,107 I.	3,243
Net imports	20,851	16,300 D.	4,551
Add lead in bond, Jan. 1	16,622	23,939 I.	7,317
Total supply	37,473	40,239 I.	2,766
Deduct lead in bond, Dec. 31	23,939	10,694 D.	13,245
Approximate consumption of foreign	13,534	29,545 I.	16,011

By far the greater part of the lead imported last year—93,068 tons, or 87.5 per cent of the total—came from Mexico, the quantity received from Canada having been comparatively small, only 9,600 tons. The Mexican lead comes chiefly in the form of base bullion, to be refined in bond.

The total supplies of lead for the year, and the disposition made of them, are shown in the following table, the figures being in short tons:

Lead Production and Consumption.

	1902.	1903.	Changes.
Desilverized	199,615	188,943 D.	10,672
Soft	70,424	78,298 I.	7,874
Antimonial	10,485	9,453 D.	1,032
Total production	280,524	276,694 D.	3,830
Add stocks, Jan. 1	70,316	30,500 D.	39,816
Add net foreign	13,534	29,545 I.	16,011
Net total supplies	364,374	336,739 D.	27,635
Domestic lead exported	3,271	56 D.	3,215
Estimated consumption	330,603	315,683 D.	14,920
Total	333,874	315,739 D.	18,135
Stocks, Dec. 31	30,500	21,000 D.	9,500

The stocks at the close of the year are necessarily estimated, since it was not possible to obtain accurate figures. We believe however, that this estimate was not far from the actual quantity, and that there was less lead on hand than at the beginning of the year. This estimate of stocks necessarily determined that of consumption also. The decline of 4.5 per cent in the lead used last year is in accordance with generally known facts.

COAL PRODUCTION OF THE WORLD.

The figures now available indicate that the world's production of coal and lignite in 1903 amounted to 877,755,053 metric tons, compared with 804,405,293 tons in 1902 and 787,179,967 tons in 1901. This great increase in coal output shows, as no other one factor, how rapidly industrial activity advanced in the years named. The United States easily led the world in developing fuel resources, in spite of the reduced anthracite production of Pennsylvania in 1902, owing to the long strike of the miners. The long-developed fields of Great Britain made a substantial gain in 1902 and 1903, and in 1903, Germany, France and Belgium increased their production. In fact, four of the five leading coal-producing countries in 1903 surpassed all previous records of output. The figures for the three years are as follows, in metric tons:

Metric tons.	1901.	1902.	1903.
United States	266,078,668	273,600,961	326,064,592
United Kingdom	222,614,981	230,728,503	234,009,484
Germany	152,628,931	150,600,214	162,619,934
Austria-Hungary	40,746,704	39,386,884	39,600,000
France	32,325,302	29,997,470	35,002,992

The stationary position of Austria-Hungary has been caused by labor difficulties and industrial depression.

In the other European countries, in Canada, in South Africa and in Australia, production increased during 1903, and some of the smaller countries, not reporting outputs, such as Mexico, made substantial gains. In fact, the activity of coal mines was a feature of the world's work in 1903.

Of the coal-producing countries above cited, Great Britain, Germany and the United States are the great exporters, though Austria also exports a large tonnage. There were no note-

worthy changes in the course of export trade during the year, except that German producers, by the close organization of their business under the Westphalian sales syndicate, made important inroads into certain markets at the expense of French and British producers, while the United States imported a considerable quantity of British coal early in the year, to meet the extraordinary demand for fuel resulting from the strike of the Pennsylvania anthracite miners in 1902.

TUBE-MILL AND FILTER-PRESS.

When a metallurgical question assumes a sudden popular interest it is apt to be badly mauled at the hands of the non-technical press. In the matter of the tube-mill there has been much writing, because it has appealed keenly to the intelligent self-interest of a large public, dispirited by repeated delays in the progress of South African development. But the principles underlying this metallurgical departure have been applied before to-day. When Mr. H. S. Denny, in June, 1903, emphasized the fact that chlorination is an exact but expensive process for treating vanner concentrate, and recognized the further fact that the gold in pyrite is mechanically mixed, and not chemically combined with that common mineral, so that fine grinding could liberate the precious metal, he exhibited the common sense that is the essence of engineering. By regrinding in a tube-mill, agitating with cyanide solution, and then separating this solution containing the gold, by squeezing the pulp in a filter-press, he obtained results so good that the method is now likely to be applied to the entire system of milling on the Rand.

The value of fine crushing as a means of liberating gold from its matrix has been the basic idea of every kind of milling, from the grinding stones of the Egyptians to the *arrastre* of Mexico and the pan of Nevada. It is 14 years since we saw Mr. T. G. Davey, now in Rhodesia, then in the Australian Alps, applying the re-grinding process to roasted vanner concentrate by using pans preparatory to amalgamation. At the Ivanhoe mine to-day Mr. R. B. Nicolson uses pans in preference to tube-mills, as being cheaper to erect and more economical in operation. Whatever of newness there is in the recent success of the tube, in which flints grind the ore with an action like that of surf on a pebbly beach, is due to improvements in the lining of this machine, rendering it more capable of resisting heavy wear and tear. Previously this machine had been used on cement clinker; in fact, the history of the tube is a reversal of precedent, for most patent pulverizers intended for crushing gold-bearing ore fail of success and are put to the lowlier task of grinding bone, slag, paint, cement and other industrial products of less hardness or smaller value. So efficient has the tube-mill proved that from Kalgoorlie it went to Waihi, El Oro and the Rand.

The metallurgical practice developed by this grinding machine represents an apparent contradiction. Formerly, the effort of every millman was to crush without making slime; that is, to reduce his ore to a definite size, or as near it as possible; he aimed to discharge through, for example, a 30-mesh screen, without pounding the pulp so that a good deal of it would pass through 200-mesh. Slime has been defined as that portion of the crushed ore which is so finely divided as not to be leachable. This definition must give way to the logic of facts. The filter-press has changed our ideas of the non-leachable. In future discussions it will be better to confine our notion of what constitutes slime to fineness rather than adaptability to any particular treatment. Rock so comminuted that it will pass through a sieve having 200 holes per linear inch—that is, 200-mesh—becomes slime when mixed with water.

Formerly, the objection to excess of pulverization in ordinary stamp-milling was that the metallic particles of gold became so flattened that they were easily carried away by the mill-water in the form of 'float gold'; while if amalgamation was followed by the separation of other valuable minerals, their concentration by gravity was hindered by minute subdivision, and the formation, in the case of brittle sulphides, of flakes that would not settle. Furthermore, in the stamp-battery itself, excess of slime means the hammering of the gold so that it resists amalgamation, while at the same time any mercury detached from the inside plates, or fed into the mortar, becomes separated into minute globules, which, when coated with the impalpable slime, refuse to coalesce, and in that condition are not arrested on the plates, but become easily transported with the tailing, taking with them inevitably whatever gold they may have caught before they became 'sickened.' When minutely subdivided, mercury is said to be 'floured,' and when in a condition rendering it unfit to exercise its function of amalgamation it is technically described as 'sick.'

Even when amalgamation, with its sequel of concentration, gave way in many mining districts to the cyanide proces, there was still an endeavor to avoid excessive pulverization, because this leaching process involved a concomitant filtration, the chief obstacle to which was the choking of interstitial spaces by slime. Although vacuum pumps and mechanical stirring attempted to overcome this hindrance to rapid filtration, and decantation tried to avoid it, not until the filter-press came into vogue was the slime problem definitely conquered. The filter-press has removed these dangers by affording a method whereby filtration and contact with solution are both secured by forcing the solution under heavy pressure through the pulp. It is the filter-press that rendered fine grinding practicable, and it will be the tube-mill, doubtless, that will give a notable stimulus to invention, whereby filter-pressing will become not the clumsy and rather costly business it is now, but a rapid and continuous, and therefore cheap, process of leaching the impalpable product of the grinding machine.

THE JOPLIN MILL PRACTICE.

Fifteen years ago almost the entire ore output of the Joplin district was dressed by hand jigs. A little less than ten years ago steam power mills began to be built, and now by far the major part of the output is furnished by such plants. In the design of these mills an entirely new type was developed, which has been followed closely in the district, and has come to be known as the 'Joplin mill.' In this type of mill, classification of the crushed ore by screens is almost entirely dispensed with. In its simplest form the ore is passed over only one screen, and that a rather coarse one, and the material is crowded over a roughing jig, which removes immediately the most of the gangue. The concentrate from this jig is re-treated on another jig, which delivers the final products, namely, galena and blende, both of remarkably high grade. The simplicity of this mill and its very low first cost, the latter due partly to the use of inferior construction and machinery, have been naturally attractive, and have led to similar installations in other districts.

A Joplin mill of nominal capacity of 10 tons per hour, and actual capacity of perhaps 8 tons, is built for $6,000 to $7,000. A mill of 8 tons per hour capacity of the type used in southeastern Missouri would cost fully $30,000, and there would be no extravagant construction at that, nor any excessive screen classification. The differences between the two mills are that one type is designed to last and afford as high a recovery of mineral as is reasonably possible. In the other type, life and percentage of recovery are both subordinate considerations. The lead ore of Flat river has to be crushed rather finer than the zinc ore of Joplin, and its value is rather more difficult to save. The cost of milling a ton of crude ore is approximately the same in each case, neglecting amortization of plant.

The success of the Joplin type of mill in the district of its origin is due to the favorable conditions. In adopting the type elsewhere it is necessary to be sure that conditions are also favorable. The mines at Joplin are apt to be short-lived, and the conditions of exploitation do not generally afford data for an advance estimate of the probable ore. The mine-owner seeks therefore a very cheap mill. The minerals and gangue of the ore are cleanly separated by a comparatively coarse crushing, and the predominant minerals (galena and blende) are easily separated from each other by ordinary jigging without careful sizing. This method is, however, inapplicable to the separation of minerals that are close in their specific gravities, like the blende-marcasite of Wisconsin, and would fail utterly in

handling an intimate mixture of three sulphides, as in the ore of Leadville, Colorado. The mill must be designed therefore to suit the ore; the ore can not so easily be made to suit the mill.

It is evident, however, that the methods developed at Joplin are going to have a good deal of influence on our milling practice and in many cases it will be valuable. The particular form of jig employed is excellent. The scheme of separating the bulk of the waste by a simple rough jigging frequently may be useful. The mixed concentrate of nearly equal settling minerals may be separated by a more careful washing, or by electromagnetic or electrostatic means as in Wisconsin. Loss of mineral in slime may be reduced by the addition of hydraulic classifiers and tables. Loss of mineral in middling may be reduced by re-crushing and re-working. Greater reliability in operation and reduction of repairs account may be attained by use of better crushing machinery. A mill designed on such lines would be more costly than the ordinary Joplin mill, but it would do better work—sufficiently better in many cases to warrant amply the increased first cost even in the Joplin district itself.

MARKET CONDITIONS.

Oct. 12.

The metal markets are generally firm, and business in most directions is good. In copper there continues to be an active demand for export, while domestic consumers are also taking good quantities. An unusual feature in this market has been the sale of a considerable amount of metal—between 3,000 and 4,000 tons—for export to China. That country has usually derived most of its supplies from Japan, but it is understood that the operation of the large Japanese mines has been seriously retarded by the drafting of workmen into the army. Some Chinese purchases are also reported from Australia.

Tin has been quiet, but very steady. In lead there is no change, either in prices or in demand. Spelter continues firm, with a very good demand from consumers, especially galvanizers. The price of ore in the Joplin market has receded from the recent high figures, and is now approaching more nearly to a normal level.

Silver has been fairly steady through the week, with only slight fluctuations in prices, and no important change in conditions.

The iron trade continues to present encouraging features. The demand for pig iron continues good, and there is a tendency to increase prices, which, however, is not marked on immediate deliveries. Furnace-men are not inclined to take orders very far ahead at present quotations, and future business has, therefore, been very limited, though negotiations are quite generally in progress. In finished material, business is also improving, especially in plates, while structural steel shows an increased demand.

The western coal markets show a decided improvement in demand for steam coal, and consequent greater firmness in prices. In the South the Alabama coal strike is still on, but the production in that State is increasing, and more mines are being constantly opened, so that the iron-makers are not embarrassed by shortage of fuel.

The seaboard bituminous tradè shows a little revival of buying at certain markets, and the general tone of the trade is distinctly brighter.

The anthracite trade has not improved much, but the outlook is distinctly better. Buying is picking up, and the movement of coal from the collieries is increasing.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Thorium nitrate to the amount of 64,520 lb., valued at $232,155, was imported into the United States last year, for use principally in the manufacture of incandescent gas-light mantles.

Zircon, hardness 7.5, and specific gravity 4.65, when transparent, is used as a gem. A certain amount is also mined for its zirconia content and is used, together with yttria, in the manufacture of the glower for the Nernst electric lamp.

Copper mining once flourished in Ireland. The Ballymurtagh mine, in Wicklow county, averaged 6,000 tons of copper pyrite per annum between 1840 and 1843. Desultory prospecting is going on at the present day in several localities.

Given that every precaution has been taken, and that a drill is boring in rock of a hardness of 7, the wear of diamonds will average about 1 carat for every 15 ft. bored. A metal bit will safely carry carbons through rock of the hardness given above for an average distance of from 80 to 100 ft. This allows for three settings of the entire crown of stones.

Loose portland cement weighs from 77 to 95 lb. per cu. ft., the average being from 85 to 90 lb. A barrel of portland cement is supposed to contain 3.5 cu. ft., packed, or about 380 lb. of cement; a sack is supposed to contain 95 lb., and four sacks make a barrel.

Experience at the Nordstern colliery at Wattenscheid, Germany, shows that iron props made of Mannesmann tubes, and costing about $205 annually in one level, have proved more economical than ordinary timbering, worth $360.

The cost of packing excavations by the water-flushing system at the Myslowitz colliery, in Silesia, is 12c. per ton of coal mined. There is, however, a saving of 8c. per ton in wages, damming and timber, so that the net cost is 4c. per ton of coal produced.

The petroleum-bearing strata show a remarkable resemblance in formation and composition the world over. Everywhere they are bituminous clay-shales and variegated clays interstratified with sandstones and conglomerates. Limestones, which may occur in such series, contain tarry materials, but rarely true petroleum, the only notable exception being the Trenton limestone of Ohio and Indiana.

An average of 0.196 oz. quicksilver was consumed per ton of ore crushed at the Alaska Treadwell in the past fiscal year. Not more than 70 per cent of the quicksilver has been recovered.

Balzac was always oppressed by financial difficulties and his schemes for making money were endless—and fruitless. One plan was to re-smelt the slag of the Roman lead mines in Sardinia. A Genoese merchant was employed to send specimens of the slag to Paris, but he did not do so until he had secured from the government the right to work the mines himself. Balzac thus made no money by his idea.

CHLORINE SMELTING.

James Swinburne, in a paper read before the International Electrical Congress, at St. Louis, September 12-16, 1904, referred to what had been done toward the commercial application of the Phœnix process. At the experimental plant at Milton a 3,000-ampere electrolytic vat was run continuously for three months. Arrangements were then made with the Castner-Kellner Company to erect an experimental plant adjacent to its works, a converter of 30 tons per week capacity being installed. Results were sufficiently satisfactory to lead the Castner-Kellner Company to take over the works and acquire a license to make zinc chloride. The Castner-Kellner Company is now operating the process, except the electrolysis, using chlorine from its soda works. It intends, however, to operate a 10,000-ampere electrolytic vat for purposes of demonstration.

METHOD OF PLUMBING A CHIMNEY DURING CONSTRUCTION.

A brick chimney, 179 ft. high, and 18 ft. in diameter at the base, with an 8-ft. flue, erected in 1902 for the power plant of the Champion-International Paper Company, at Lawrence, Mass., was plumbed by a novel method, suggested by R. A. Hale and described in *Engineering News* as follows: After the chimney was started, a transit point was established at some distance from the base of the chimney, and a line run over the center point; in this line, near the base of the chimney, a stake was driven, the line being marked by a tack therein. Later this mark was replaced by one on a card fixed to the chimney itself. Another transit line nearly at right angles with the former was also established. As the chimney was built up, any deviation whatever from the perpendicular in any direction would be at once noted from either one or both of the two lines, and steps taken to correct it. This was rendered easier by establishing a center pole on the interior staging, around which swung a radial arm, thus maintaining the exact circular shape of the chimney, while the pole, about 3 in. diameter, was used for the sight from the transit.

In this way the chimney was carried up with no delay or bother to the workmen from ordinary plumbing. To check results, after the chimney was finished a heavy weight was swung in the center, and it was found by this means that the deviation was about 3/8 inch.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

COAL WASHING.

The Editor:

Sir—I note with interest in the issue of your paper of September 29 your editorial on coal washing. I note in particular the paragraph in which you say, "The matter to which we call attention is the lack of any sort of standard by which results obtained in washing, particularly in washing rather finely-ground coals, can be compared." Mr. L. A. Harding and the writer have for some time past made a special study of bituminous coal washing, and in all our research have found but little data of any particular value to one wishing information on this subject.

We have also found that the superintendents or foremen of many existing plants appear to know but little of the theories and methods of coal washing, and we find many who wash their coal in a certain manner because some one, perhaps the designer of the plant, told them it was the best way, whereas, in many cases, had the foreman thoroughly understood the business he was engaged in, he could have, by careful investigation and adjustment of his own proposition, improved the quality of his product and lessened the cost of same.

You speak of the use of the specific gravity solution as a method of determining the efficiency of a plant in operation. This method, if properly understood, is the best that can be used, but we find that but few understand the true application of it. We have found some that think that by the use of a certain specific gravity solution, the resulting 'float' from a sample of refuse is 'good coal' and is therefore lost in the refuse, whereas this may not be true. 'Good coal,' when speaking of coal for coking purposes, is the coal which runs low enough in sulphur and ash to make the required quality of coke, that is, if the coke must be a 1 per cent sulphur coke, and practice has proved that 0.2 per cent sulphur will burn off in coking, then the definition of 'good coal' in this case is all coal analyzing 1.2 per cent or under in sulphur; and though a considerable quantity of coal may float on the specific gravity solution from the refuse, it can not be called 'good coal' unless the analysis of the same proves it to be of a grade capable of producing the desired quality of coke.

G. R. DELAMATER.

Pittsburg, Oct. 3, 1904.

TITANIFEROUS IRON ORES.

The Editor:

Sir—I read Mr. Rossi's discussion on titaniferous iron ores, in the JOURNAL, with much interest, hoping to find some new points; but I see nothing more than he has heretofore said in various papers. I recognize Mr. Rossi's ability as a metallurgist and his persistence in experiment along a given line, though I fear he is still far from securing permanent results in that line.

We all know that excellent iron is made from New Jersey ores carrying 0.75 to 1.50 per cent titanic acid, and even more, and that blast furnace operators do not complain of trouble with those ores. We know also with regard to ore carrying a higher percentage of titanic acid—that is, what is generally known as a titaniferous ore—that a furnace was operated for some years on such ore from the Adirondack region, producing pig iron of good grade, from which excellent steel was made. Mr. Rossi has told us of the work done by his own experimental furnace. The fact remains that neither of these furnaces is now in operation.

Moreover, it must be remembered that the operation of a small charcoal furnace, with low blast, is a very different matter from that of a large modern stack, using coke and high blast, and turning out anywhere from 300 to 500 tons of iron daily. It is in such stacks that iron must be made now to secure a commercial success. Until some manager has been bold enough to make a fair trial in a large modern furnace—and has succeeded—iron-makers cannot be persuaded, I fear, to give up their beliefs and prejudices with regard to titaniferous ores. To make such a trial would require courage and willingness to risk the expenditure of a large sum of money—more than most iron companies are willing to hazard.

For my part, I should like very much to see Mr. Rossi succeed. If we can make the titaniferous ores of the Adirondacks and of Canada available, it will do much to restore the iron industry of the East. The predominance of the Central West—the region which can get Lake Superior ores by a moderate haul from the eastern terminals of the Lake water route—now seems secure for a long time to come; but the utilization of these ores would give the East a chance to compete—which would be a good thing for all of us.

INVESTOR.

New York, Oct. 7, 1904.

LE ROI MINE.

The Editor:

Sir—The people of British Columbia are greatly interested in the affairs of Le Roi mine, for the reason that it has been undoubtedly one of the greatest properties in Canada, and would have paid large dividends had it received honest and consistent management during the past few years. It should have been Canada's best advertisement, instead of its disgrace. Your recent editorial references to the company's affairs embolden me to offer comment at this time.

When Messrs. F. W. Bradley and John H. Mackenzie were appointed engineers in charge, people generally hoped that the property was finally to receive a fair chance; but these hopes were quickly dispelled by the somewhat peculiar and unheard of action of two of the four directors—Messrs. Waterlow and MacMillan, of London. Mr. Jewell, the third director, takes little interest in the affairs of the company, thus leaving Sir Henry Tyler, the chairman, practically in the minority.

The action above referred to consisted in the appointment by Messrs. Waterlow and MacMillan of Mr. MacMillan, formerly emigration agent at Winnipeg, and more recently a stock broker and mining promoter, as general manager of the property. Mr. MacMillan is, therefore, both managing director and general manager, although it is questionable whether he has ever been inside a mine, and certain that he has no knowledge of mining, smelting or milling such as is essential for the management of Le Roi. Beside this extraordinary step, the board of directors—that is, Messrs. Waterlow and MacMillan—authorized Mr. MacMillan to negotiate for the acquisition of the Snowshoe mine, a very low-grade silicious property in the Boundary country, owned by Messrs. Waterlow and MacMillan. The Snowshoe discontinued operations many months ago, apparently being unable to pay expenses on a $1.75 treatment charge made by a local smelter.

Mr. MacMillan has been for some time past preparing the directors of Le Roi for this consolidation by referring in an indefinite manner to "fluxing ores," said to be necessary to help the smelting of Le Roi ore. Since Le Roi ore is silicious, and the Snowshoe ore still more so (containing in the neighborhood of 1.2 or 1.3 per cent copper and about $1.50 in gold and silver), it is impossible for the ordinary metallurgist to understand just what fluxing qualities the Snowshoe ore possesses which will make it to value in smelting Le Roi ore. It seems probable that an attempt will be made at the next stockholders' meeting to show that the Snowshoe mine (of which Mr. MacMillan is managing director, and his associate director, Mr. Waterlow, is the principal owner) should be acquired.

Messrs. Bradley and Mackenzie have resigned as engineers in charge, for the reported reason that the policy of Mr. MacMillan was opposed to the real interests of Le Roi stockholders, and because they realized that their recommendations would receive little or no attention from Mr. MacMillan, whose aim was to have Le Roi absorb a number of properties which he had acquired in Waterlow's interest, but which have never made a dollar and are not to-day in operation.

A stockholders' meeting is likely to take place in the course of a month or two. The shareholders of Le Roi have certainly been long-suffering, and deserve better treatment than they have received. If Messrs. Bradley and Mackenzie (both of whom have excellent records as skillful and successful mine managers) had been left in charge of affairs, the property would have been worked strictly in the interests of the company, and there is good reason to believe that it would have been placed upon a dividend-paying basis in the near future. Mr. MacMillan's administration seems to promise only more manipulation and additional investments of dubious character.

It is to be hoped that the stockholders will look carefully into this matter before endorsing the administration and plans of the present management.

OUTSIDER.

Spokane, Oct. 3, 1904.

THE GOLDFIELD DISTRICT, NEVADA.

The Editor:

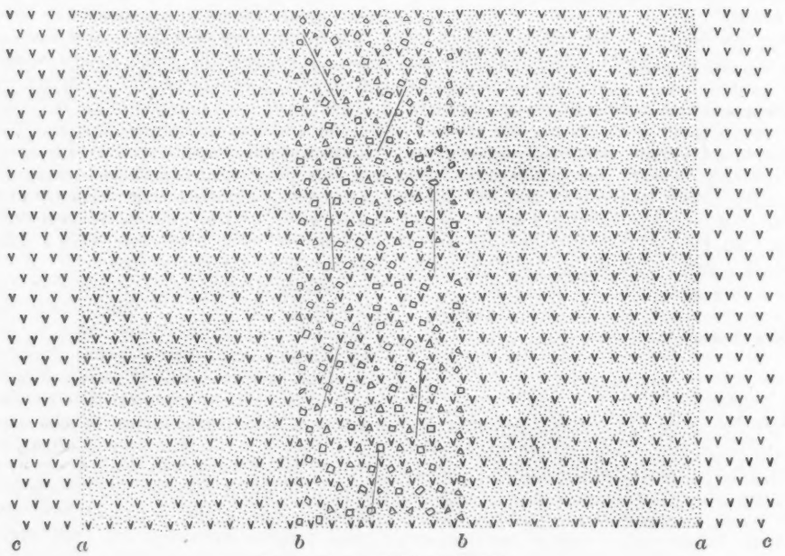
Sir—In an article published under this head, in the issue of this JOURNAL for September 8, certain statements are made, which I fail to reconcile with the notes taken during a six-weeks' personal examination of the Goldfield mines.

Among others, the occurrence of quartz or quartzite dikes intrusive in an andesite formation is asserted. My own observations suggest that the so-called dikes are merely silicified zones within a rhyolite country, the remnant of a former extensive flow. The geological sequence of events I inferred as follows: The basal rocks consist of jasperoids (silicified limestones). These are very conspicuous at the base of the southern slope of Columbia mountain, and, as suggested by Mr. J. E. Spurr[1], might be correlated with the Cambrian or Silurian limestones found at Silver Peak. Some time in the Tertiary these sedimentaries were intruded by a highly si-

[1]United States Geological Survey, *Bulletin* 225.

licious magma, which solidified, in a coarse-grained granite, in which the ferro-magnesian silicates are totally absent, thus making this rock a typical alaskite. The silicification of the limestones is undoubtedly due to the intrusion of this alaskite, and must have been very intense, as the rocks may be mistaken at first sight for very fine-grained basic eruptives. The district was then flooded by a rhyolite flow, which in turn was intruded by dikes of a more basic character.

The rhyolite is of a grayish white color, the texture being porphyritic. The phenocrysts consist of quartz and orthoclase with sanidine; the last-named mineral is especially abundant in the silicified portions of the rock. This magma is evidently of the same character as that of the alaskite; both contain the same mineralogical constituents and differ similarly from their respective normal types by



Sketch covers width of 40 feet.

aa—silicified rhyolite. *bb*—zone of brecciation. *cc*—rhyolite.

STRUCTURE OF THE JANUARY VEIN, 85-FT. LEVEL

their lack of the dark minerals. In the presence of such evidence one is naturally led to believe that both rhyolite and alaskite formed part of the same original magma. The admittance of the kinship of the rocks, nevertheless, does not imply that the rhyolite is underlain by the alaskite. It seems rather that the rhyolite constitutes that portion of the magma which has flowed from one or more vents over the surrounding limestones, the alaskite then representing the deeper-seated portions in the vents. This relation, however, can be determined only by further field observations, as it is quite possible that some time intervened between the alaskite intrusion and the rhyolite flow.

The veins belong to the normal propylitic type. Cutting across the rhyolyte, they consist of silicified masses of that same rock, and vary from 2 to 40 ft. in width. Within these zones of silicification shoots of exceedingly high-grade ore are found. Outside of these bonanzas, the values in the silicified rhyolite do not exceed $2 per ton. The ore consists of auriferous pyrite with attendant decomposition products in the zone of oxidation. In the sulphide zone the pyrite is partly altered to marcasite, and some sphalerite was detected under the microscope in a specimen from the 185-ft. level of one of the big mines. The accompanying sketch will reveal the vein structure; it seems that we are here in presence of a case of secondary enrichment. It will be found that the silicified masses or veins shade without sharp transition into the surrounding rhyolite. The high-grade values occur in connection with lines of brecciation within the veins. A re-opening of these veins in connection with the subsequent outbreaks is suggested, and it is possible that a renewal of circulatory activity may have contributed to the formation of the rich oreshoots in the otherwise practically barren veins.

While the discussion of geological phenomena hardly belongs to the mining engineer, I yet believe that the collection of strictly accurate data, geologic or otherwise scientific, lies within our scope of work. We can place these before the scientist, within our possibilities, in friendly reciprocation, of the innumerable advantages we derive by their studies.

Leon Dominian.

Denver, Colo., Sept. 30, 1904.

PYRITE SMELTING.

The Editor:

Sir—Before the collected articles on pyrite smelting appear in book form I would like to add a few words on the effect of alumina in the pyrite furnace.

It has been noted that the furnace, in this process, seems to select its own slag. This is quite true, and an apparent reason is at first offered by the fact that the iron oxidized by the furnace is a factor in the formation of the slag over which the metallurgist has but little control. The quantity of lime may be varied in the slag within certain limits. so also any other constituent added, but not so the iron. Small causes will vary the rate of oxidization in the furnace and consequently the amount of iron oxide supplied to the slag, but this variation does not affect it materially. The relation of silica to iron remains about the same.

The true reason of the pyrite furnace apparently selecting its own slag will be found in the fact that the slag is emitted from the furnace at the lowest formation temperature possible with the slag-forming material supplied. Matte and slag that is free to move from a source of heat will commence to flow at a temperature not far above that of their formation. If the flow is hindered by their having to make their way or part of their way through a mass of incandescent material, or by having to move by a tortuous passage to an exit, they will continue to absorb heat only until the heat imparted to them is balanced by the heat removed by the rapidity of the flow.

The oxygen ratios in the slags formed by this method of working vary from the singulo-silicate, in which the ratio of the oxygen of the acid to the oxygen of the base is as 1 to 1, to those slags in which the ratio is as 8 to 5. The majority of slags fall within the 4 to 3 ratio. The following block out of Prof. Richards' slag table, as published by Hofman,* covers the whole range of pyrite slags, as far as I am aware, my observations extending over some 1,800 slag analyses made in three different works.

Formulæ of Silicates.	O in bases to O in acid.		Per Cent.		
2 RO SiO_2	2:2	FeO	57.58	53.24	48.90
		CaO	12	16	20
		SiO_2	30.42	30.76	31.07
5RO $3SiO_2$	5-3:2	FeO	53.58	49.24	44.93
		CaO	12	16	20
		SiO_2	34.42	34.76	35.07
3RO $2SiO_2$	3-2:2	FeO	55.60	51.20	46.70	42.25
		CaO	8	12	16	20
		SiO_2	36.40	36.80	37.30	37.75
4RO $3SiO_2$	4-3:2	FeO	52.66	48.22	43.78	39.34
		CaO	8	12	16	20
		SiO_2	39.34	39.78	40.22	40.66
5RO $4SiO_2$	5-4:2	FeO	46.62	42.17	37.72
		CaO	12	16	20
		SiO_2	41.37	41.83	42.28

If these are traced through his tables of formation temperatures they will all be found to be among the lowest temperatures determined.

With a pure pyrite or pyrrhotite ore, to which, if not already present, silica is added, there will result, after an oxidizing smelting, a simple silicate of iron of low formation temperature and low melting point. Lime added to this in proper proportion invariably lowers the formation temperature, and some of the lime may be replaced by alumina without materially affecting the slag in this respect. The general tendency of alumina, however, is to raise the melting point of slags and to increase their viscosity, the latter being a very undesirable quality, as it interferes with the proper settlement of the matte.

It is seldom that uncombined alumina forms a part of the smelting charge, for the reason that pyrite ores are usually associated with schist, porphyry, etc., and often the ore itself contains aluminous minerals, as is the case with the Tennessee pyrrhotite. If there is added to the smelting charge a natural silicate of alumina of the bi- or tri- or higher silicate order, there will be no breaking up of this combination, as the heat of the low temperature slags is not sufficient to effect it. There will be dissolved just so much of this aluminous silicate as the slag can carry at the given temperature, and no more. If there is more of this silicate than the slag can dissolve, it is left behind in the lower part of the furnace, and the fusion zone is forced higher and higher until the charge finally smelts on top and the furnace suddenly freezes up.

In furnaces running on a reduction smelting,

* 'Temperature at which Certain Ferrous Silicates and Calcic Silicates are Formed in Fusion,' etc. *Transactions* American Institute Mining Engineers, Vol. 29, p. 682.

with 9 to 15 per cent of coke on the charge, slags from the fusion zone above the tuyeres continue to absorb heat or become superheated by running through the incandescent fuel below, and, as their heat rises, they become more and more capable of breaking up or absorbing combinations having a higher melting point.

It seems to me that the slags first formed in any blast furnace work must be of the simplest, low temperature formation, silicate order that can be made from the constituents present at that point, and as the superheating goes on, silicates of a higher formation temperature are merely dissolved in it with a probable decomposition after solution.

The working limit of alumina in pyrite slag made direct from ore is about 7 per cent, and although this may be forced to 8 per cent or 9 per cent for a time, trouble is pretty sure to result. A furnace concentrating low-grade matte, from the first operation to a 40 per cent or 50 per cent converter matte, runs very much hotter than an ore furnace, and under these conditions it should be possible to add to the slag a full 10 per cent of alumina through the fluxes, if required.

To illustrate the effect of an excess of an aluminous material in pyrite work the following is cited: At a plant which had been heap-roasting their output for a number of years an ordinary orthoclase quartz-porphyry was used as a flux for the roasted material, and the furnaces ran very well. The analysis of the green ore (unroasted pyrite) and the porphyry was as follows:

	Green Ore.	Porphyry.
Silica	5	77.30
Iron	35	2.75
Alumina	Trace.	15.20
Lime	Nil.	0.63
Zinc	6	.....
Sulphur	43	.....
Copper	6	.....

With the exception of possible trouble with the zinc, the ore seemed eminently suitable for pyrite treatment, and this was resolved upon. As quartz was a somewhat expensive flux and the porphyry exceedingly cheap, an endeavor was made to retain the latter, though it was soon found to be conducive of bad work. Later an experimental run was made, with the following results: The furnace was blown in as usual at 9 a.m., and run on a quartz flux until 12:50 p.m., to make all furnace conditions as perfect as possible; at that hour no other alteration was made in the charge except to change quartz for porphyry. At 4 p.m., three hours and ten minutes after feeding the first porphyry charge, the furnace began to show signs of distress, and at 6:30 p.m. slag and matte ceased to run. The furnace was allowed to cool down and the end jacket removed. A section was cut down on the chilled material, and the following noted: The unfused porphyry was found to occupy a space extending from some six inches below the tuyeres to the same distance above the bosh line, a thickness of about two feet in the middle of the furnace and two feet six inches to three feet against the jackets. Above this the unfused portion of the charge extended to the feed-floor.

A portion of the unfused porphyry was broken out and carefully separated into white unfused porphyry and interstitial slag, and analyzed, with the following result:

	SiO_2	FeO	CaO	Al_2O_3	ZnO
Porphyry flux	77.30	2.75	0.63	15.20	.....
Unfused porphyry	81.80	4.81	0.91	11.45	.....
Interstitial slag	57.70	23.01	4.09	15.33	.....
Free-running furnace slag	33.30	48.75	5.10	7.20	4.41

The viscid high temperature interstitial slag remained near where it was formed and blocking the air passages through the porphyry flux, cut off the blast from the upper part of the charge. Later experiments, in conjunction with quartz, proved its entire unsuitability in any proportion. The aluminous material used at Mount Lyell is a pyrophyllite schist, the aluminous mineral being a bisilicate and very finely diffused through the rock. The aluminous minerals in the quartz porphyry were orthoclase and oligoclase were trisilicates, and were distributed in large grains and crystals.

G. F. BEARDSLEY.

New York, Oct. 10, 1904.

MOLYBDENITE: ITS USE AND VALUE.

This is one of the few so-called rare minerals that is finding a larger use industrially, as a result of cheaper production and improvement in quality. The initiative has undoubtedly been electric smelting, by which it is possible to produce a high-grade metal, and alloys that are practically free from carbon, and can be marketed at about one-third the price asked for inferior articles ten years ago. Molybdenite (MoS_2) at that time was used only for the preparation of molybdates for analytical work, used to isolate phosphoric acid in raw materials employed in the metallurgy of iron and steel. Molybdenum metal was considered a curiosity then, and, owing to its crude method of manufacture, contained too much sulphur, and was too expensive to be adapted to commercial purposes. To-day there are several manufacturers in the United States, employing electricity to produce metallic molybdenum 98 to 99 per cent in purity; ferro-molybdenum, 50 to 55 per cent, and nickel-molybdenum, 75 per cent Mo, and 25 per cent nickel. The annual output, as nearly as can be ascertained, is 35,000 lb. molybdenum metal, worth $2.75 per lb., at New York; and 16,000 lb. ferro-molybdenum, quoted at $1 up, according to quality. The best customers are the steel-makers, who use a mixture of 4 per cent molybdenum in the form of metal and alloys, to toughen and harden their products. Metallic molybdenum made in the electric furnace has a sp. gr. of 9.01, is as malleable as iron, and can be welded, filed and polished with ease. Molybdenum steel resembles tungsten steel in a general way, although it is less affected by annealing and tempering.

The supply of molybdenite has grown remarkably during the last ten years, prospecting for new deposits being encouraged by high market prices for good mineral. The United States consumes practically all it produces, chiefly in Arizona and New Mexico, and also imports ore at 20 per cent duty from Norway and Canada. Deposits are also known to exist in France, Queensland, Scandinavia and Japan, and before the Eastern war some Japanese ore of good quality was received in America.

Generally speaking, molybdenite resembles graphite, but the two may be distinguished by scratching white paper; the former will give a bluish-gray streak, and the latter black. Molybdenite occurs frequently in the veins of granite or gneiss, and is sometimes associated with gold, tungsten, bismuth or iron ore. The hardness of molybdenite is only 1 to 1.5, and sp. gr. 4.7 to 4.8, and in color it is pure lead-gray.

To be marketable the ore should contain at least 45 per cent molybdenum, but when concentrated mechanically or hand-sorted to separate the gangue the metallic content must average from 50 to 60 per cent. At present quotations at New York are 20 to 25c. per unit ($180 to $237.50 per long ton) for ore averaging 95 per cent molybdenum sulphide. It is sometimes customary for consumers to purchase the ore at an f. o. b. mine price, the conditions of the contract being based on the quality of the ore, quantity available, and distance from economical transportation.

THE IRON AND STEEL INSTITUTE.

The latest circular from the secretary's office in London gives a provisional program for the coming meeting of the Institute, which is to be held in the United States. According to this, the members from abroad will arrive in New York October 21-23, and will have their headquarters at the new Hotel Astor. October 24 will be given up to excursions to points of interest about New York, and in the evening the opening session of the meeting will be held. On October 25 there will be an excursion up the Hudson river, and on the following day, October 26, there will be two meetings of the Institute for the reading of papers, with a dinner in the evening. On October 27 members will leave for Philadelphia, remaining in that city over the following day, and going to Washington on October 29. A start will be made from Washington to Pittsburg on October 31, and, after spending two days in Pittsburg, the party will go on to Cleveland on November 3. One day will be spent in Cleveland, and on November 5 the members will leave for New York, stopping on the way at Buffalo, Schenectady, Albany and other points, finally returning to New York on November 9. Those members who wish to visit the St. Louis Exposition will leave Pittsburg on November 3, and will return to New York in time for the steamer leaving that city November 12.

The reception committee, which has been formed in this country, has, as we have already noted, John Fritz as president; Charles Kirchhoff, chairman of the executive committee; Robert E. Jennings, treasurer, and Theodore Dwight, secretary. The local reception committee in New York is headed by James A. Burden as chairman; G. W. Maynard as vice-chairman, and R. Moldenke as secretary. The heads of the sub-committees are Stephen W. Baldwin, finance; L. W. Francis, invitation; C. A. Moore, reception; E. E. Olcott, transportation; Theodore Robins, Jr., entertainment, and T. C. Martin, banquet.

The following papers are announced for reading at this meeting:

1. 'Iron and Steel at the St. Louis Exposition,' Professor H. Bauerman, member of the International Jury.

2. 'A West African Smelting-House,' C. V. Bellamy, Lagos; with an appendix by F. W. Harbord.

3. 'The Influence of Carbon and Phosphorus upon the Strength of Iron and Steel,' H. H. Campbell, Steelton, Pa.

4. 'The Rateau Low-Pressure Turbine at Steel Works and Collieries,' E. Demenge, Paris.

5. 'A Dry Air Blast Apparatus,' James Gayley, New York.

6. 'High-Speed Tool Steels,' J. M. Gledhill, Manchester.

7. 'The Determination of Carbon and Phosphorus in Steel,' H. Jüptner von Jonstorff, Vienna; Andrew A. Blair, Philadelphia; Gunnar Dillner, Stockholm, and J. E. Stead, Middlesborough.

8. 'Acid Open-Hearth Manipulation,' Andrew McWilliam and W. H. Hatfield, Sheffield.

9. 'A Power Gas Plant for Johannesburg,' P. J. Mallmann, London.

STAMP TAPPETS.

By M. P. Boss.

While in general features the stamp-battery is essentially what it was a third of a century ago, it has been touched up and refined in detail, and its efficiency and endurance greatly augmented thereby. What seem trivial details to a layman in mechanics aggregate in a machine so as to very materially affect its profit-earning qualities. Any one looking at so simple a thing as a stamp-battery of to-day can hardly realize that it has been the focus of many thinkers for many years. Nevertheless, the standard tappet as we use it possesses no detail that was not common to it many years ago. In fact, one detail commonly applied on the Comstock upward of thirty years ago, and fully appreciated at that time, is less generally used to-day, because manufacturers can save a little expense when it is not exacted. I refer to the counterbore.

Of course, before the days of steel tappets much care was required not to split the tappet, and that was an added incentive to its employment, yet none will gainsay that heavy driving of tappet keys involves time and wear and tear. With a proper counterbore but a fraction of key pressure is required that otherwise is necessary to hold a tappet from slipping. I use the term "proper counterbore" advisedly, for, while most understand the "three bearing points" idea, few fully realize the wedge principle involved.

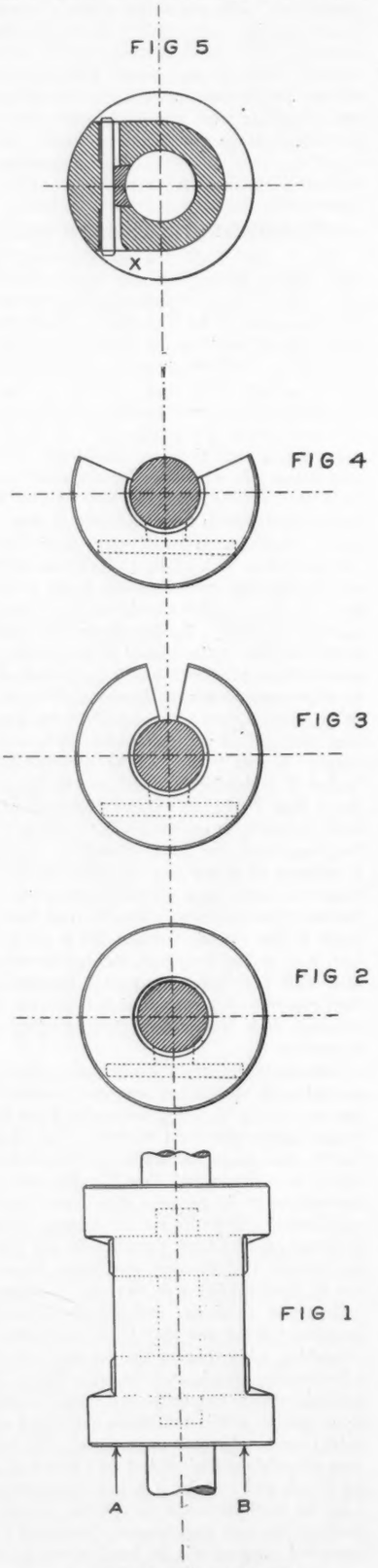
To demonstrate fully the two points referred to I add the drawings given in Fig. 1, 2, 3 and 4.

In Fig. 1 the line between A and B is at right angles to the center line intersecting the gib, and in the course of rotation of the stamp these points are alternately struck by the cam in operation. The blow being struck at a point outside of the center line, through the pressure strain, clearly has a tendency to swerve the tappet from alignment with the stem. If the tappet yields in the least infinitesimal degree to this tendency, it more than returns when the blow follows upon the opposite side, and the tappet will work upward on the stem at each recurring change in alignment.

Fig. 2 represents the plan of a tappet without counterbore. As, necessarily, a tappet must be bored to an easy fit upon the stem, when key-pressure is but lightly applied against the gib, the contract of tappet-bore and the stem is but a narrow line, that gives weak resistance to the disaligning influences referred to. Not until the key-pressure against the gib is made great enough to develop the elasticity of the metal in the tappet sufficiently to enwrap the stem with a broad line of contact opposite to the gib can the tappet resist the disaligning influences of the heavy blows of the cam. Even a narrow counterbore aids this materially, as it gives two parallel lines of contact opposite the gib, and less key-pressure is required. This is one feature of the counterbore.

Fig. 3 and 4 are the plans of tappets with counterbore. For the sake of clearness in showing the lines of contact to stem, the metal is shown cut away opposite the counterbore, thus emphasizing the contact points or lines.

Fig. 3 represents a narrow counterbore, and Fig. 4 a wide one. To think of the stem acting as a wedge between the two points of contact when key-pressure is applied is impossible with No. 3, but conceivable with No. 4. Lines tangent to the stem at points of contact correspond to the plane surfaces of the wedge it represents. So, if a counterbore extends 120° —one-third of the circumference—every pound of pressure applied by the key is repeated at each of the two other points, whereas where there is no counterbore, the key-pressure is repeated only at the one point opposite the key. Thus it is shown that a counterbore extending 120° augments the pressure upon the stem 50 per cent. This is aside from the advantage of the widely apart parallel lines of contact-resisting disalignment.



STAMP MILL TAPPETS.

Extending the counterbore beyond 120°, the wedging advantage gains rapidly, and it is not extravagant to say that a tappet on a 1,200-lb. stamp could be successfully held by a single hard-wood key, by means of a counterbore of say 170° of circumference. Not by any means is it to be inferred that this extreme is desirable, but a counterbore of 120° or 140° is economy in the long run.

Another feature in a tappet is to make the key-way openings easily distinguishable, the wide from the narrow. Rounding one side, as shown in Fig. 5, is simple and effective. Still another minor feature is that the inner sides of the flanges on a tappet should be more or less flattened, so that they may be struck by a heavy hammer, when moving a tappet, without battering or disfiguring its flanges.

COAL-FIELDS OF INDO-CHINA.—In a recent paper in the *Revue de Mineralogie*, G. H. Monod describes the coal-fields of Indo-China. He divides them into three groups: (1) That on the eastern coast of Tonkin; (2) that of Quang-Nam, and (3) the Tertiary lignites in the small basins of the Red River valley. The most important mine in the Hongay district is the open-air workings at Hatou, where a bed of anthracite 30 ft. thick is exploited. This mine employs 2,500 coolies, and the coal is shipped to Hongay by a railroad about 7 miles long. About a quarter of the output is made into briquettes. The quantity extracted in 1902 was about 310,000 metric tons. Another anthracite mine northwest of Hongay, in the province of Quang-Yen, yielded 10,000 tons in 1901. The mines working in Quang-Nam are at Nong-Son; the output was, in 1902, 25,000 tons. The lignite deposits mentioned have been prospected extensively, and one mine was opened near Yen bay. Anthracite coal is also mined at Yun-Nan. In conclusion Mr. Monod says that the anthracite coals make good briquettes by the mixture of foreign bituminous coal; foreign coal can be replaced by native coal when railroad facilities are provided.

SIZE OF BY-PRODUCT COKE-OVENS.—In a paper read before the Cleveland Institution of Mining Engineers recently Paul A. Mantmann described the various types of coke-ovens, from the earliest bee-hive oven down to the most recent types. The recent by-product ovens are essentially long, horizontal, narrow-arched coking chambers, with doors at either end, the chambers being heated by outside flues either vertical or horizontal. Exclusion of atmospheric air is an essential feature of operation. The yield in a given time depends on the duration of the coking period, but varies from 2.5 to 4.5 tons in 24 hours. The dimensions of the principal ovens are as follows:

	Length, Feet.	Width, Inches.	Height, Feet.
Simon-Carves	28	20	6.50
Semet-Solvay	30	16.5	5.50
Coppée	30 to 33	16 to 24	4 to 4.5
Otto Hoffman	33	20	5.25
Otto Hilgenstock	33	20	5.93
Huesner	29.5	22.5	5.67
Franz Brunck	30	20	5.50
Koppers	30	18 to 20	5.50
Von Bauer	26 to 29	21.5	7
Collins	30	18 to 20	5 to 6
Poetter	33.5	20.75	6.25

It will be seen that there is almost a general agreement in these dimensions; the variations in size are not large.

COPPER MINES OF LAKE SUPERIOR.-I.

By T. A. RICKARD.

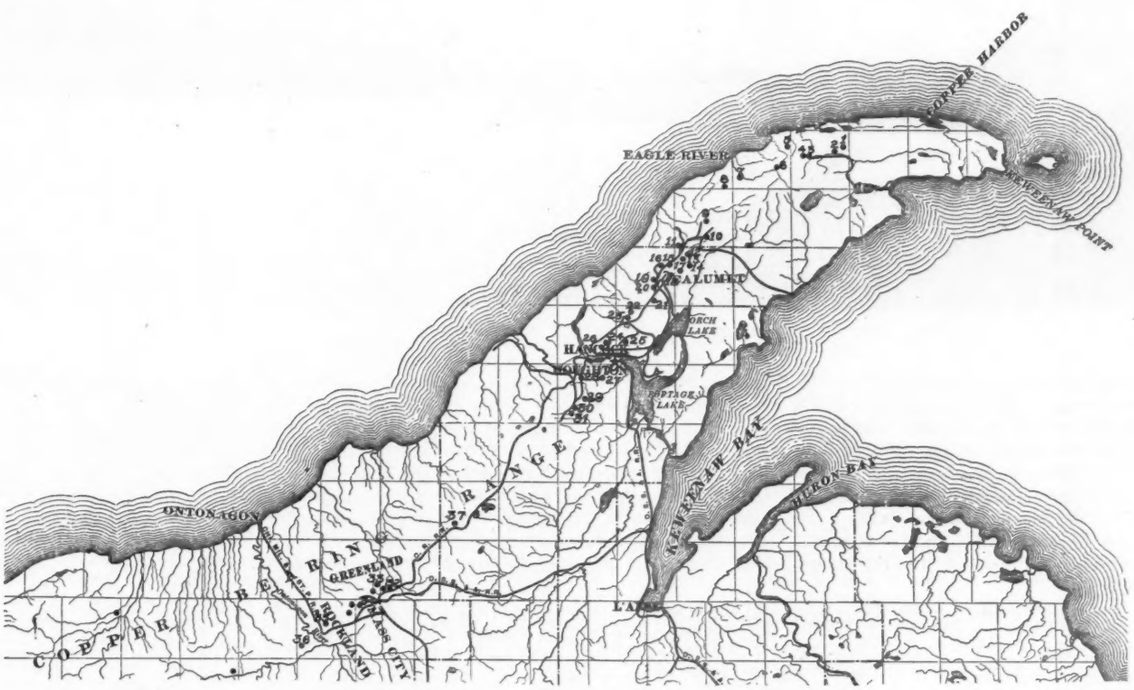
If you take any map of North America and look at the Great Lakes which separate the United States from Canada you will see that a solitary tongue of land projects from the south shore into the center of Lake Superior. That is the Keweenaw peninsula, a part of the State of Michigan, and the copper mining region which it is my purpose to describe. On a map of the United States you will find Houghton marked as an inland town in the south-central portion of the peninsula, and there will be but little hint of the fact that it is situated on a waterway which renders the northern half of the region not a peninsula, but an *insula*. The Portage lake and river, with the canal that forms the western outlet to Lake Superior, are, in fact, only links in that long line of water communication which reaches from Duluth, through the Great Lakes to the mouth of the St. Lawrence, a total distance of 2,100 miles.

The wheat fields of Manitoba, the iron ores of Minnesota, Wisconsin and Michigan, the copper of the Michigan mines and the lumber of the forests, all find an outlet along this inland waterway, so that it is not surprising to find that the locks at the Sault Ste. Marie register a tonnage more than double that which passes through the Suez canal.[1] During 1903 the traffic passing the Sault Ste. Marie amounted to 34,674,437 tons, on which freight charges amounting to $26,727,735 were paid. Mineral products were as follows: Iron ore, 21,654,898 tons; coal, 6,937,633 tons; copper, 112,877 tons, and salt, 454,822 barrels.

From New York the traveler goes by train to Buffalo, 440 miles in nine hours, and there takes steamer. The *North West*, on which I traveled, is 386 ft. long, 44 ft. beam, and has a rating of 5,000 tons, with 8,000 h.p., drawing 17 ft. of water. It is not many years since such a vessel would have been considered a large craft, even on the Atlantic. Comparison may be made with the White Star steamers on the Pacific, which are 420 to 441 ft. long, 42 to 44 ft. wide, with a rating of 4,205 to 4,676 tons.

From Buffalo to Houghton the distance is 811 miles, which required a voyage of three nights and two days—days of unclouded beauty, spent on quiet waters and diversified by the swiftly-moving panorama of a country undergoing a variety of industrial development. On a sunny morning in August the *North West* steamed up the arm of Portage lake, here only half a mile wide, and drew up at the wharf just below the drawbridge uniting the towns of Houghton and Hancock, which lie at the foot of two facing hillslopes of gentle demeanor. Beyond the drawbridge the shimmering waters of Portage Arm disappeared around a wooded bend; the scene breathed a quiet and orderly spirit, there was none of the uncouth ruggedness or the squalid unrest such as I associated with mining activity, the air contrasted refreshingly with the sweltering turmoil of New York City, and not till I recognized the shaft-houses on Quincy hill, the smoke of the smelters at Hancock, the buzz of a lively saw-mill, and the cluster of red buildings marking the College of Mines, did I realize that I had indeed reached the port of entry to a mining region famous throughout the four corners of the globe.

The larger number of productive copper mines is in the northern part of the peninsula, in a series extending from Hancock to Calumet, and a little beyond, making 15 miles altogether; another important group of growing mines is found south of Houghton, to a distance of 8 miles. Beyond this continuous mining belt there is the outlying district of Eagle River along the northern edge of the peninsula, and in the south there is the Ontonagon country. The accompanying map will make this clear.



THE KEWEENAW PENINSULA. Each square is a township, 6 miles.

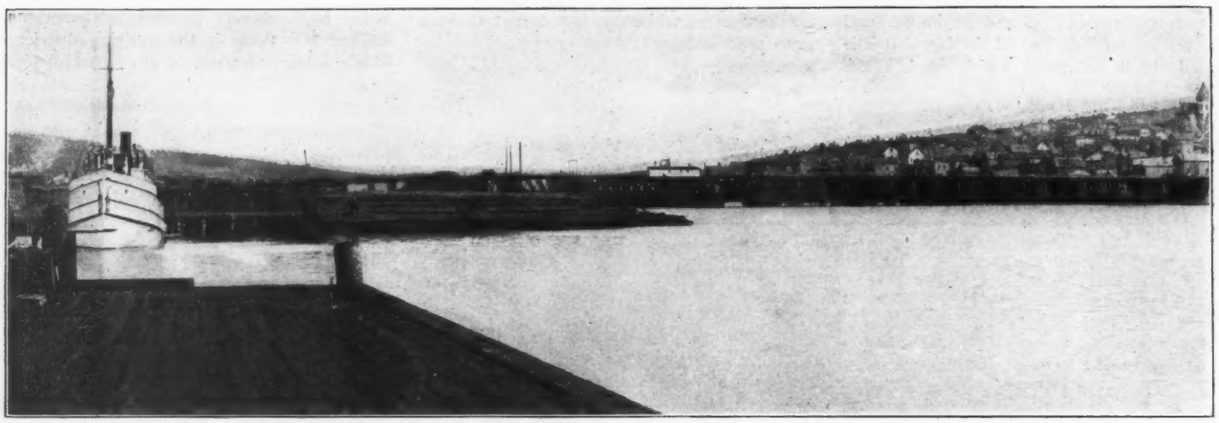
KEY TO MINES.

1. Aetna
2. Empire
3. Delaware
4. Amygdaloid
5. Copper Falls
6. Central
7. Phoenix
8. Cliff
9. Mohawk
10. Ahmeek
11. Allouez
12. North Kearsarge
13. Wolverine
14. Mayflower
15. Centennial
16. Tamarack, Jr.
17. South Kearsarge
18. Calumet & Hecla
19. Tamarack
20. Osceola
21. Tecumseh
22. Rhode Island
23. Franklin, Jr.
24. Franklin
25. Arcadian
26. Quincy
27. Isle Royale
28. Atlantic
29. Baltic
30. Trimountain
31. Champion
32. Belt
33. Adventure
34. Mass
35. Michigan
36. Victoria
37. Winona

The present population of this mining district is about 78,000, of whom 38,000 are distributed over the town of Calumet and its adjoining suburbs of Laurium, Red Jacket, Blue Jacket, Hubbell and Limerick. Beside the towns mentioned, there are smaller settlements, mainly of workmen's houses, near the Centennial, Wolverine, Mohawk and other individual mines. Across Portage lake, on the South Range, there is a village of about 3,000 people at Atlantic, with smaller communities at Huron, Trimountain and Painesdale. At Hancock there are 7,000 and at Houghton only 4,000 inhabitants. Hancock and Houghton are divided by the arm of Portage lake, but united by a drawbridge. Both are pretty clean-looking communities, the better residences being on College avenue, overlooking the water and

[1] The traffic passing the Sault in the eight months of navigation is double that of twelve months at Suez.

dominated by several fine buildings, among them the East Houghton school and the imposing cluster which marks the College of Mines. An excellent electric car service unites the twin towns with Calumet, 12 miles distant. This large settlement is more evidently a mining community, because the big shaft-houses of the Tamarack and Calumet & Hecla mines soar above the streets and dominate the surrounding houses in a lordly way. Calumet is a community of many nationalities; among the workmen employed by the Calumet & Hecla mine 38 nations are represented. Hence the multiplicity of religions and the corresponding diversity of 'thirst-parlors'; one might say that there is a conglomeration of churches and an amygdaloid of saloons. When walking the streets one overhears many strange languages, from the homely Cornish dialect to the foreign accents of Finland. There are signs and names variously intelligible to the traveler, according to the prevailing humidity, from *Paiva Lehti* to *Soumalainen Saloonki!* Notwithstanding the extraordinary mixture of races, disorderly scenes are rare and the police are conspicuously few in number, one reason probably being the insular position of the district, exit from which is either over the Houghton-Hancock bridge or by boat on the surrounding waters.



WHARF AND BRIDGE AT HOUGHTON.

THE TOWN OF CALUMET, SHOWING SOME OF THE BIG MINES.

While underground at the Baltic mine, on the South Range, I saw a code of signals at the shaft-station, the explanations being given in English, Finnish and Italian, respectively. At the Wolverine the changing house is arranged for various nationalities, the English taking one end of a changing room and Italians the other; in a second room the Austrians have one half, while the other is set aside for Finns.

Of the numerous nationalities the Cornish are eminently the best miners, and next to them come the Finns. In early days the Irish were more numerous than at present, and they used to have frequent 'scraps' with the Cousin Jacks, as the men from Cornwall are called. When the Swedes and Finns began to come in, the Irish and Cornish tended to draw together. The Finns are separated by a distinct cleavage into "temperance Finns" and the "others"; the latter are apt to be rampagious when under the influence. The former make excellent citizens; they come from a rigorous climate and an ungrateful soil, and they are now cultivating the forest clearing with marked success, so as to develop a profitable agriculture in this northern country. They do not stick to mining long; from trammers they graduate quickly to miners, and then, after about ten years of continuous work, they either take up a tract and clear the forest from it, or buy a farm already made, according to the amount of their savings.

The miners are mainly Cornishmen and Finns, the trammers are Finns, Italians and Austrians; the timber gang is apt to have a Cornishman as chief, with Austrians for helpers. The latter are really Croatians, for the most part. They are quiet, hard working and peaceable. The Italians are often divided among themselves by feuds due to the localities of their origin; those who know Italy are aware of the antipathy between the people of separate provinces; the consequence is that at the present time most of the Italians in this district come from Piedmont, and when any miners arrive from other parts of Italy they are treated as 'outsiders,' getting so little help from their compatriots that they usually depart to more hospitable surroundings. The Finns are ambitious, stubborn and thrifty; they are quite separate from the Norwegians and Swedes; they work hard and are generally educated to the point of a little reading and writing, which cannot be said of all the other foreigners. But the Cornishmen hold their own, beyond question; they are the most capable miners, having a great eye for ore and a hereditary instinct for "reading the signs" underground. At the Atlantic mine, where a low-grade rock has caused the contract system to act as a process of natural selection, the Cousin Jacks have proved the most fit to survive amid keen competition, the result of which is expressed by the fact that most of the miners are Cornish, with a few Finns, the latter often making up in muscle and persistence for lack of inherited instinct. The Cornish hate shoveling, and prefer to do the

actual breaking of ground, and for this reason they are better miners than laborers. Many good stories are told of them: One day a superintendent going his rounds called up to a couple of Cornishmen who had a hard contract and asked how things were going. "How is it, boys?" "Mighty 'ard, Cap'n; she's pretty tough." "Well, boys, brace up; you want pride and perseverance to help you." He went on. Behind him he heard the two miners: "Say, Bill, who be they, Pride and Perseverance?" "I doan't know, Tom—guess they're the two Finns in the next stope."

The laboring man is rarely better off than in this district. Wages average from $2.30 to $2.50 per shift for miners, and from $2 to $2.25 for trammers, contractors doing about 25 per cent better. Board is from $16 to $18 per month; the rent of a four-room house is from $4 to $6 per month. The companies build substantial dwellings, usually with stone foundations, arranged in orderly rows, whose neatness and regularity has not much of the picturesque, but bespeak far healthier conditions than that mingling of the squalid and romantic which characterizes other mining camps. At Painesdale and at Calumet two presidents of well-known mining companies have given library buildings for the use of workmen and at Houghton the College of Mines has a reference library of worthy proportions. The necessaries of life are not high, the climate is healthy, good schools are plentiful, hospitals are easily available, and, on the whole, it is obvious that the miner in this region is better off than the higher paid men who live amid the desolations of Arizona and Nevada, or among the even more brutalizing environments of such places as Butte City and Broken Hill.

The copper mines owe more to Lake Superior than their geographical habitat. Their milling practice has been modified profoundly by the unlimited supply of fresh water available for the mills, which, requiring as they do about 3,500,000 gal. per stamp per day, would soon exhaust an ordinary inland stream; the splendid forests that clothe the surrounding country have furnished the enormous supply of timber required for the support of excavations underground, and the tax upon even the resplendent woodlands of Michigan can be appreciated when it is stated that the Tamarack mine alone engulfs half a million feet, board measure, of timber monthly. Beside wood and water, the mines have been furnished a magnificent highway of transport. An excellent bituminous coal comes from Pittsburg, 150 miles by land to Cleveland, and thence by water 735 miles, at a cost of $2.66 per ton; of which only 30 to 40 cents is the steamer freight, and 8 cents per ton the cost of unloading.

The loading and unloading is done on a big scale; at Cleveland, by the shore of Lake Erie, I saw cars holding 50 tons of coal apiece emptied bodily, as if they were small buckets, into a vessel, at the rate of 1,000 tons per hour, and while I was at Houghton the *Martin Mullen*, a lake steamer, brought a load of 7,200 tons of coal, and unloaded the whole of it at the dock of the Copper Range Railroad within two days. At other lake ports, possessing better facilities, the unloading is done at the rate of 10,000 tons in 4½ hours. These facts impressed me as I remembered the coaling of a mail steamer at Port Said, a long string of coolies walking a gang plank, carrying little willow baskets with coal on their heads, entering one hatchway, discharging their burden and trotting down a neighboring gangway, singing monotonously all the time, with the result that the passengers were given 8 to 10 hours of sooty unpleasantness and uninterrupted noise while a few hundred tons of coal were taken aboard.

A NEVADA SULPHUR MINE.

The Rabbit Hole Sulphur mines, recently described by Mr. George I. Adams (*Bulletin* 225, United States Geological Survey), are situated in northwestern Nevada, at the western base of the Kamma mountains and about 35 miles from Humboldt House, a station on the border of the Black Rock desert, from which they may be reached by wagon road. The rocks in which the sulphur deposits occur are cemented by quartz and chalcedony, and apparently have been leached by hot waters. It is thought that the sulphur at these mines was derived from a great depth and deposited as a result of solfataric action.

The sulphur is obtained from open pits, tunnels and underground chambers, where it occurs as masses of crystals depending from the walls of irregular cavities and incrusting free surfaces. It has the beautiful yellow color of crystallized sulphur, with here and there a reddish tinge due to the presence of a small amount of cinnabar. The most important mass of sulphur is, however, of a different type, and has the appearance of having originated in a flow of molten sulphur which welled up and filled open channels in the rocks. It contains occasional fragments of rocks, but is remarkably pure. Its color is a dark resinous yellow. The mines have been worked since 1900 by the Nevada Sulphur Company, of San Francisco. The equipment consists of two retorts, each of about 2.5 tons capacity.

PRODUCTION OF PETROLEUM IN ROUMANIA.—According to official statistics recently published in the *Petroleum Review*, the output of petroleum in Roumania during the first half of the present year was 213,702 metric tons. The Prahova district, as usual, contributed the greater part of the output. The figures indicate that the industry is growing steadily, and the product for 1904 will probably exceed previous records.

SCHISTOSITY AND SLATY CLEAVAGE.—In a bulletin recently published by the United States Geological Survey, Mr. George F. Becker advances a theory to account for the schistose and cleavage structures in rocks. The explanation generally accepted among geologists is that a fracture perpendicular to the line of pressure would run along the flattest faces of the component grains and meet the smallest number of them. This hypothesis implies that the mass is heterogeneous and that the adhesion between the component particles is smaller than the cohesion within the particles. According to Becker's theory, cleavage is due to a weakness of cohesion, antecedent to rupture, on planes of maximum tangential strain, the effects being influenced by viscosity, although the direction is independent of viscosity. If in any portion of the mass before strain a small sphere is supposed to be marked out, this sphere after strain will have become an ellipsoid, called the strain ellipsoid. The cleavage will make with this smallest axis an acute angle equal to or greater than 45°, and increasing as the strain grows greater.

IRON AND STEEL FOR WESTERN CANADA.

By William Blakemore.

The rapid development of western Canada, which is adding to its permanent population at the rate of 100,000 a year, is causing a corresponding activity in industrial enterprises, especially the production of coal. Taking the Northwest Territories and British Columbia only into account, the output, which was little more than 1,000,000 tons three years ago, will be 2,000,000 next year, and probably double that in three years from date. Hitherto, however, the West has been heavily handicapped by dear iron and steel, the whole of which is brought from the East. Thus foundry pig all through the region referred to (excepting only the Coast, where water transport comes into play) costs from $25 to $30 per ton, the present price at the furnaces in Alabama being $9.50, duty $2.50, and the balance from $12 to $17 per ton for freight, according to destination. Light tram-rails, many of which are used in the mines, cost from $40 to $50 per ton, and heavy steel rails from $30 to $40. It is obvious that, taking the price of pig as a basis, every hardware article used in the West is an expensive luxury, and the great wheat-raising industry, especially, is heavily handicapped in respect to agricultural implements. This and mining are the two industries that suffer most, and as the future of British Columbia depends on the development of her mineral resources, which consist almost entirely of large bodies of low-grade ore, necessitating economic cost of production and treatment, it will readily be seen how vital any appreciable reduction in the cost of iron manufactures and mining machinery would be.

Is it possible to establish a steel-making industry in British Columbia which would serve the West with appreciably cheaper iron and steel and realize a profit on its product? This is the problem offered for solution. The conditions demanded for the success of such an enterprise are: 1. A sufficient market. 2. Transportation. 3. A suitable ore. 4. Flux. 5. Fuel. 6. An assembling point of the raw material where it can be converted economically. Do all these conditions exist to-day? I believe they do.

1. The present consumption of pig iron in crude form in the territory under consideration is 50,000 tons per year, and it is increasing at the rate of at least 15 to 20 per cent. This does not take into account the steel rail trade. Of light rails, chiefly for mining purposes, the present requirements are not more than 3,000 tons, but for heavy steel rails the market will be very large for years to come. Taking railways under contract to be completed within the next five years, we have approximately the following mileages, based on the estimate that rails manufactured in southeastern British Columbia would find a market as far east as Winnipeg, which is the nearest point at which they could possibly come into competition with the eastern product: Canadian Pacific and allied lines, 700 miles; Grand Trunk Pacific, 2,000 miles; Great Northern and other projected branches, 300 miles; making, on a conservative estimate, 3,000 miles in five years, or 600 miles per year, requiring for lines and sidings not less than 100,000 tons of rails annually. Nor is it likely that railway construction will be retarded afterward, in view of the opinion just expressed by so high an authority as Sir Sandford Fleming, that "there will be

three or four transcontinental lines through the Canadian Northwest in a few years."

If the right grade of steel can be produced, there is no doubt about a large and increasing market in Canada alone, and, as I shall presently show, there is no reason why the far distant western States of the Union should not be served with steel, as they are with smelting fuel, from British Columbia.

2. The question of transport involves a decision as to the assembling point of the raw material and its conversion into the finished product. After careful consideration it seems certain, in the light of present discoveries of ore, that this point must be on Kootenay lake, near the Landing and about 15 miles north of the international boundary line. From here there is railway accommodation by the Canadian Pacific railroad eastward to the mining regions of the Crow's Nest Pass and Alberta, to the newly-exploited Flathead country, and to the wheat-raising lands of the Northwest; by the same system west through the rich mining districts of the Kootenays, and later by the Coast Kootenay railway to the Pacific, north by the same system to the main line, to Calgary and Edmonton, and so in touch with the Grand Trunk Pacific; south by the Great Northern to the neighboring States of Washington, Montana, Idaho and Oregon. No place is more favorably situated for communication with the main lines and the markets of the West. While treating this branch of the subject it may be well to note the actual rates in force for freight from eastern to western points, and then to show the cost of transport from Kootenay to the principal western centers. The present rate for steel in carload lots from Pittsburg is as follows: Calgary, $20; Vancouver, $15; Nelson, $25.20; Spokane, $25; Butte, $25; Seattle, $25 per ton. The lowest rate at which it is likely that this class of freight could be carried from Kootenay lake is 1c. per ton-mile. This would give, approximately, from Kootenay to the same points, as follows: Calgary, $3.60; Vancouver, $6.10; Nelson, $0.50; Spokane, $2.00; Butte, $6.00; Seattle, $5.50. A comparison of these figures is instructive as showing the margin on freight alone on local manufacture.

3. The supply of suitable ore is a vital consideration, and one about which there may be doubt in the minds of those most interested, because so much has been written and said about British Columbia ores which, on investigation, has proved to be utterly worthless for the purpose of steel manufacture. So far as I know, and I have closely followed all iron ore prospecting in the West for nearly ten years, only one genuine bessemer ore has been discovered, namely, at Kitchener. This was purchased on the advice of the well-known expert, W. N. Rose, of Marquette, Mich., after spending $30,000 in testing, by the Canadian Pacific railway. A full description of the property has been published in a pamphlet issued by the Canadian Mining Institute. It is sufficient for my purpose to say that the property, known as Iron Mountain, is situated on the Crow's Nest railway, 30 miles east of Kootenay lake, and is ten miles long. It contains at least five veins of the highest grade hematite, varying from 5 to 20 ft. thick, and, on a moderate estimate, 100,000,000 tons of ore. Assays of more than 100 samples have been made, some by Mr. Robert Hunt, of Chicago; by McGill University, and practical tests by the Dominion Steel Company, Cape Breton. Many gave as high as 67, 68 and 69 per cent metallic iron; the average gave metallic iron, 60; silica, 5; sulphur, 0.10, and phosphorus, 0.03 per cent. By way of comparison, I give the following average of the best Lake Superior ore: Iron, 60; sulphur, 0.10; phosphorus, 0.06; and of Newfoundland ore, used by the Dominion Steel Company: Iron, 55; sulphur, 0.012; phosphorus, 0.60. Every subsequent test has strengthened the opinion of those who have maintained that this is the highest grade bessemer ore on this continent. At first the property was considered too small to justify the establishment of a steel plant, but prospecting work in 1903 and 1904 has shown that the veins extend at least thirty miles north in unvarying regularity, and it has been satisfactorily demonstrated that the large deposits exploited by Mr. George McMilian near the head of Crawford bay are an extension of the Kitchener bodies. This solves the question of quantity, and, in my opinion, determines the commencement of steel making in this locality at no distant date.

4. As to flux, there is an unlimited quantity of limestone in the mountain ranges east and west of Kootenay lake. On the east side of Iron mountain there is a ridge of dolomite ten miles long and one mile wide. This limestone can be delivered at Kootenay landing for $1 per ton.

5. Next comes fuel. Kootenay Landing is about 150 miles from Fernie, the headquarters of the Crow's Nest Pass Coal Company, which produces the highest known grade of smelting fuel, both coal and coke. The former, on analysis, gives fixed carbon, 68; volatile combustible matter, 25, and ash, 5 per cent. The coke has been used exclusively at British Columbia smelters since 1898; its reputation is so high that half the output is exported to the States in spite of the duty. The cost of this coal at Kootenay Landing would be $3, and of the coke $5 per ton. The figures already given show that Kootenay Landing possesses all the advantages required for an assembly point. With high-grade bessemer ore (60 per cent) at $3, limestone flux at $1, coal at $3, and coke $5 per ton, pig iron can be manufactured at a cost of $10 to $12 per ton in normal times. No doubt during periods of inflation, the cost would run to $15, but the increased cost would be more than compensated by the higher price. Pig iron at $12 would mean steel rails at $20. Taking two points as a test, say, Nelson and Vancouver, the actual cost of pig delivered, allowing $5 per ton profit, would be, at the former, $17.50, against $30 at present, and at the latter $23, as against $26 now. The lesser difference at the Coast is due to the low water freight on British rails coming round the Horn. In steel rails the advantage would be still greater, with the government bounty of $7 and the import duty to help. Sufficient has been said to demonstrate the possibility of revolutionizing western development by establishing in pioneer land the most stable and important industry which can advance the growth and settlement of a country.

The market and the natural resources are ready to the hand; it only requires capital and brains to convert a great possibility into an assured success.

GYPSUM IN ONTARIO.—It is reported that extensive deposits of gypsum have been discovered in the Abitibi country, on the line of the new Temiskaming & Northern Ontario railroad.

A GREAT ENGINEERING PROBLEM.

By W. A. Lawson.

The Federal Government has united with the State of California in a great engineering undertaking; the sum of $800,000 has been jointly appropriated to defray the cost of the work, one-half by Congress and the remainder by the legislature of the State.

The object is to arrest the flow of mining débris in the Yuba river, and prevent its descent into the Feather, from which stream it is carried into the Sacramento, to the detriment of navigation. The project, as approved by the United States Chief of Engineers, calls for the construction in the Yuba of a series of dams or barriers, and also a large settling basin, about 12 miles above the city of Marysville, where the river leaves the foothills of the Sierra Nevada and enters the Sacramento valley. Nothing of the sort has ever before been attempted for the reason that in California alone has hydraulic mining been carried on in such a way and to such an extent as to impair navigation and inflict great injury to agricultural lands.

The magnitude of the task before the Federal engineers composing the California Débris Commission cannot be realized without some knowledge of the nature of hydraulic mining as formerly practised in that State. This method of winning gold originated there nearly fifty years ago, but at first it was followed in a crude fashion. It consists in the use of water under pressure, through hose or pipe, to wash gravel containing gold. In the beginning canvas hose was used, and the stream was directed against the material to be washed through an ordinary nozzle. But with the invention of the 'giant' or 'monitor' both the quantity of water and the pressure were enormously increased, so that it became practicable to literally wash down mountains into the rivers.

The monitor was invented in Marysville, a town which has suffered greatly through the destructive effects of hydraulic mining in obliterating the channel of the Yuba, and so making high and costly levees needful to keep out floods, and also through the choking of the Feather by the débris to such an extent as to stop navigation by steamers, which formerly ran regularly from San Francisco to that place, by way of the Sacramento. The device consists of a heavy cast-iron nozzle, with a ball-and-socket joint, so that it may be turned in any direction. It is provided with an ingenious little lever called a deflector, which when pressed against the stream issuing from the nozzle utilizes the force of the water to move the monitor as desired. By means of the deflector a child may turn the stream with but slight exertion of strength, despite its tremendous volume and velocity.

Some of the largest hydraulic mines have used half a dozen monitors at one time, each discharging a powerful stream against the side of a mountain, and washing down an enormous quantity of earth, sand and gravel into the sluices provided for the reception of the material. As much as 1,500 miner's inches of water has been supplied to one monitor, under high pressure, so that the discharge was equivalent to 25,000,000 gal. per 24 hours. The Spring Valley mine at Cherokee Flat, near Oroville, used 36,000,000 gal. daily, which was three times the quantity consumed by the city of San Francisco. And in the winter season the mine's supply was increased to 70,000,000 gallons.

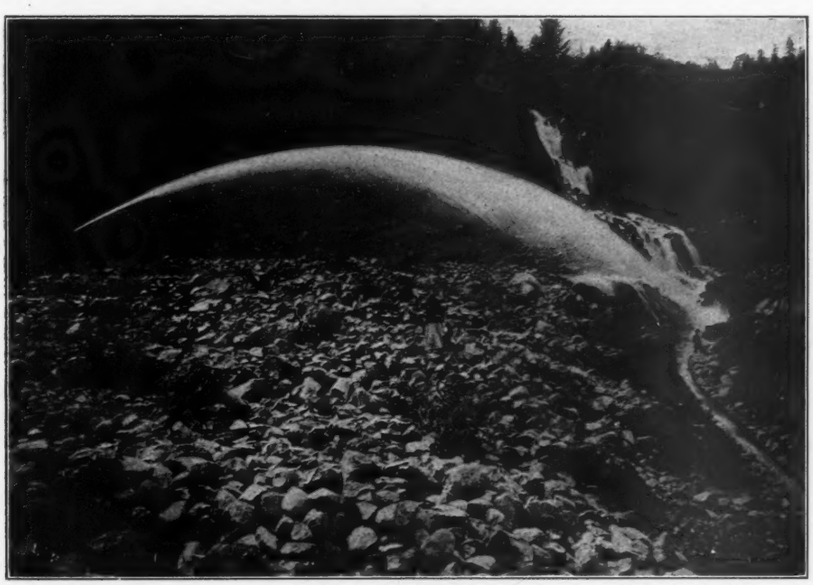
This same mine had 122 miles of ditches,

taking water from reservoirs 63 miles distant in the high Sierra. The water was carried across the deep gorge of the Feather river through an inverted siphon pipe thirty inches in diameter, which was regarded at the time of its construction as a marvel of hydraulic engineering, the water at the lowest point of the siphon being under a vertical pressure of 856 ft. The pipe was riveted sheet iron, 14,000 ft. long, and stood a strain of 404 lb. per square inch.

In this, as in other hydraulic mines, the monitors were kept working at night as well as by day, electric lights being used. An idea of the gigantic force they brought to bear on the hills may be obtained from the fact that in the course of years they made an excavation a mile long, half a mile wide and 300 ft. deep. The hills thus washed away were composed chiefly of sand and pipe-clay, resting upon coarse gravel overlying the bed-rock. As in numerous other hydraulic mines, the tailing was discharged through a tunnel bored through the bed-rock, so as to afford an outlet bed, so as to permit of the discharge of the waste—usually into a watercourse. The North Bloomfield, one of the most famous of the hydraulic mines, had a tunnel 8,000 ft. long, through solid rock. Its ditches had a total length of 55 miles and cost $500,000. They carried 4,000 inches of water, discharged under a vertical pressure of 380 ft. through nozzles seven and eight inches in diameter.

The Excelsior hydraulic mine at Smartsville, on the Yuba, had six bed-rock tunnels, of a total length of 13,300 ft., and 115 miles of ditches, carrying 6,000 inches of water. Its water system cost $1,000,000. In seven years the several claims embraced in this mine, according to the report of the company owning it, yielded $3,000,000 in gold, washed from 8,600,000 cu. yd., an average yield of 34c. per cubic yard.

The streams from the monitors, under a pressure of 300 ft. or more, have a velocity of not less than 150 ft. per second, and are so rigid near the nozzle that they cannot be cut with an axe in the hands of a powerful



A CALIFORNIA HYDRAULIC MINE.

man. It is related that an attempt to do this once resulted in severe injury to the venturesome person who wielded the implement, the force of the water tearing it from his grasp and throwing him many feet away from where he stood. Such a stream causes a roar that can be heard a mile distant. When it strikes, a huge boulder weighing a ton or more may be made to dance like a pebble. In a mine well supplied with water the quantity of material washed is several thousand cubic yards per day. When hydraulic mining was at its height on the Yuba, between 1880 and 1890, the annual discharge of débris into the stream was 22,000,000 cu. yd., and the hydraulic mines of California were collectively moving 46,000,000 cu. yd. of material each year. To aid the work of the monitors, blasting powder was employed. Tunnels were bored into the face of the bank to be washed, and tons of powder were exploded in them at a time. The quantity of material discharged into the Yuba alone each year was sufficient to fill a street 11 miles long and 120 ft. wide to a depth of 75 ft. The same quantity, it was then estimated, would have filled the Erie canal in 18 months.

to a neighboring ravine, whence the water and its burden of 'slickens' flowed down a creek to a swamp bordering upon the Sacramento river. This mine, however, was an exception, in the fact that its débris did not reach navigable waters or escape into any large stream.

The chief hydraulic mining field was the drainage basin of the Yuba, where the foothills merge into the Sierra Nevada. The deep auriferous deposits of gravel are there found in the channels of ancient rivers, of a bygone geologic age. These channels are filled with a bluish gravel and run generally at right angles to the present rivers, which in places intersect them and expose their wealth to the gold-seeker. Overlying the old channels are hills or mountains of sand, gravel and clay.

The gold in these ancient channels was found chiefly on the bed-rock and in the deep-lying gravel, much of the superincumbent sand and clay being comparatively barren. But in some instances all the material washed contained gold enough to pay for the work. To drain the channel and bed-rock it was usually necessary to bore a long tunnel through the rim-rock forming one side of the ancient river

The cobbles and coarse gravel discharged from the mines remained in the mountain channels of the rivers, but the finer material —the sand and clay, constituting what in California is called 'slickens,'—was carried by the force of the current into the valley of the Sacramento, where in times of high water much of it was deposited on farming lands. By this means upwards of 40,000 acres of rich bottom along the Yuba, Bear, Feather, American and Sacramento rivers were ruined for cultivation, and more than 300,000 acres of other valuable lands greatly damaged or depreciated in value. Towns and cities as well as farming districts were put to enormous expense for the building of levees, because of the growth of the flood plain of the rivers in the valley, and navigation in the bays of Suisun and San Pablo, as well as in the Sacramento, was seriously impaired by the deposits of débris in the channels. The losses and dangers became so intolerable that suits were begun in the State and Federal courts, to obtain injunctions to prevent the further discharge into the tributaries of the Sacramento of tailing from the hydraulic mines. After much costly litigation both State and Federal injunctions were made permanent against the hydraulic miners, and since that result the hydraulic process has been used in California chiefly on the watershed of the Klamath river, where there is little agriculture to be affected.

Numerous engineering plans have been formulated, to permit hydraulic mining to proceed upon the Sacramento watershed, but none has ever been found wholly satisfactory. In 1880 the State appropriated $200,000 for the building of the brush dams across the Yuba and Bear rivers, to check the flow of débris. These dams were made of willow brush laid upon the deposits of sand and clay in the river beds, and were weighted with bags of sand, and also gravel and rock. They were in great part washed away by the first flood, and, being considered failures, were never rebuilt.

Under the provisions of what is known as the Caminetti Act, passed by Congress in 1903, the California Débris Commission was created. It consists of three Federal engineers, appointed by the President. It was empowered to adopt plans for improving navigation, and to construct works for impounding débris and preventing further deterioration of navigation on the Sacramento and San Joaquin rivers; also to permit under suitable restrictions such hydraulic mining as could be carried on without injury to the streams or farming lands. The Commission has issued upwards of 400 permits to mine by the hydraulic process, requiring the resulting débris to be impounded behind dams. Brush dams are authorized for small mines and in ravines. In watercourses log-crib dams are required, some of which are filled with stone and rise to a height of 40 ft. None of these barriers is of permanent character, and in the course of time their decay will permit much of the stored débris to reach the rivers.

To prevent illicit hydraulicking the farmers maintain an Anti-Débris Association, which sends watchmen to the mountains to keep an eye on the mines. Where illegal operations are in progress, or where work done under the permits of the Commission is considered injurious to the valley interests, suits are brought to restrain the miners from committing further injury.

In accordance with the requirements of the Caminetti Act, the California Debris Commis-

sion devised the present project for the construction of barriers in the Yuba above Marysville—not to permit the general resumption of hydraulic mining upon the stream above, but to restrain and impound the débris already in the channel or its tributaries, above the site of the projected works. The greatest difficulty for the engineers arose from the lack of suitable foundation for the dams. Where they are to be constructed the deposits of hydraulic mining detritus in the Yuba, consisting of cobbles, gravel and sand, are from 80 to 90 ft. deep. In 1902, when work first began on the barriers, piles were driven, but they were subsequently washed out by floods. The stream has a fall of 20 ft. per mile, which gives a current of 10 or 12 miles an hour in times of high water.

Owing to the difficulty of fixing piles firmly in the treacherous deposits covering the old bed of the Yuba, one of the barriers planned in the original project was constructed last year of fascines of brush laid upon the loose foundation and weighted with rock to keep the brush in place. But in December last the greater part of this barrier was washed out, the stream cutting away the foundation. This plan is now considered a failure, but the barrier is being re-constructed, piling being driven as deeply as possible into the débris deposits, in four rows, eight to ten feet apart. The spaces between the rows are to be filled in with gravel, and the whole structure capped with concrete. The object is not to hold water, but by checking the force of the stream to cause it to drop the heavier material held in suspension or rolled along the bottom.

The project is for a series of three dams to restrain the heavy débris, and then at Daguerre Point a fourth barrier will be constructed to throw the water over to the south side of the Yuba, into a settling basin, which is to have a capacity of 14,000,000 cu. yd. sediment, and may be enlarged to hold 50,000,000 cu. yd. The basin will be three miles long and half a mile wide. The Daguerre Point barrier will have a length of 4,000 ft. To provide for the discharge of flood-waters without washing away the settling basin, a cut is being made through Daguerre point. This calls for excavating about 700,000 cu. yd. earth and rock, and its estimated cost is $127,000. The total cost of the works is estimated at $780,000, and, of the total appropriation of $800,000, the sum of $20,000 has been expended for land and barrier sites.

The barriers thrown across the stream are to be about half a mile apart, and the highest of them will be, eventually, 40 ft. above the river bed.

The people of the Sacramento valley have no great faith in the success of this project, as a whole. But it is argued that, should it fail to accomplish the purpose, the situation will be no worse than at present, because the material in the river channel, in the absence of attempted restraint, would continue to descend into the watercourses of the valley, further impairing drainage and navigation, and making more levee-building needful. The hydraulic miners, on the other hand, hope the plan may succeed, so as to show the feasibility of allowing the general resumption of hydraulicking with a new series of dams in the rivers to hold the resulting débris.

Recently success has been attained in America in making cold-drawn boiler tubes from 30 per cent nickel steel.

THE IRON ORES OF SHADY VALLEY, TENNESSEE.

By F. Lynwood Garrison.

Shady Valley is situated in about the center of Johnson county, the extreme northeast of Tennessee. It lies about eight miles east of the south branch of the Holston river and 15 miles north of the Watauga, another tributary of the Holston. The topography of this locality is peculiar in the fact that the lowest elevations of the bottom of the valley are from 500 to 1,000 ft. higher than the bottoms of any of the neighboring valleys or plateaus. The Shady Valley or synclinal is almost completely surrounded by mountains rising to elevations of 3,000 to 4,000 ft. above sea level and from 500 to 1,000 ft. higher than the floor of the valley itself. The basin is five miles in length, spoon-shaped, with its major axis approximately north and south, and maximum breadth nearly two and one-half miles. Its only drainage outlet is at the lower or northern end, into a narrow gorge through which the Beaver Dam creek forces its way. This gorge is practically continuous thence to the hamlet of Damascus, across the Virginia boundary in Washington Co. The valley is therefore a veritable *cul de sac*, which fact is of paramount importance when considering the genesis and economic value of the iron ores.

The geology of the Shady basin and the neighboring Doe Valley resembles in a general manner the synclinal troughs occurring in the same rocks elsewhere in the Appalachian system. The Paleozoic rocks are here folded, faulted and crumpled up in much the same way as in other sections of this great continental flexure.

The predominating and characteristic formations, giving their local designation and geological sequence of superposition, are the Watauga shale, Shady limestone, Erwin quartzite and the Hampton shale, all belonging to the Cambrian period. The Unicoi formation, which in some places contains also an amygdaloid basalt, may possibly be present in some of the elevations surrounding the valley, but its existence has not been positively established. These formations have been accurately described by Mr. Arthur Keith, of the U. S. Geological Survey, to whom we cannot do better than refer.[1]

The Watauga shale is not especially noticeable in Shady Valley, except in the northeastern corner of the basin, somewhat high on the mountain side. Across the ridge, in what is known as Doe Valley, it covers a large area and is especially well developed at the Shoun's Cross-roads mine, where it contains some extensive deposits of iron ore remarkably free from silica and clay, so much so that some of the ore is mined and shipped directly to the furnaces without washing or special preparation.[2]

The Watauga formation consists chiefly of red, brown, purple and yellow shale, in some places calcareous, in others sandy, and usually argillaceous. The beds of red sandstone are local, argillaceous and differ from the sandy shale chiefly in being more massive. The sandstones range in thickness up to six feet and are closely interbedded with the shale. The thickness of the formation cannot be determined in the Doe Valley on account of the extreme folding and crumpling, but in the neighboring regions is 1,000 to 1,100 feet.

The Shady limestone formation derives its name from the valley, of which it probably constitutes the floor. It consists mainly of limestone, 750 to 800 ft. thick, of a bluish or gray color, weathering on outcrop to a dull gray or black. Some of the layers are mottled, blue, gray and white, often seamed with calcite. Thin seams of blue and gray shale occur in many parts of the formation. Silicious impurities in the form of sand and especially chert are frequent.

Decay proceeds faster in this formation than in any other in the region. Its clays are deep and strong, but often so covered with detritus from the other formations as to greatly impoverish the naturally fertile soil.

The ores, which are the subject of this paper, occur in the clays of the Shady limestone formation. The Erwin quartzite, so characteristic of the locality, consists of white sandstone and quartzite from 500 to 700 ft. thick and of uniform appearance. The strata are composed of grains of fine white sand, more or less cemented by secondary silica. Its layers are massive and show scarcely any partings of shale. Between the quartzite and the overlying Shady limestone are a few feet of sandy shale and thin sandstone, in which are found a few lower Cambrian fossils of the *Olenellus* fauna. *Scolithus* (a characteristic Potsdam fossil) borings are common in the quartzites. Erosion and weathering make little headway on the close texture and insoluble materials constituting the beds of the quartzite formation, hence high ground and white cliffs mark its course. Its crests are sharp and rocky, and the cover of soil is thin and irregular.

The Hampton shale formation consists in most places of argillaceous and sandy shales from 600 to 800 ft. thick. Their color when fresh is bluish-gray or gray, varying to yellow and buff on exposure. As a rule they are bounded by their more or less silicious layers.[3]

The iron ores of the Shady basin belong, as we have already observed, to the Cambrian period, and must not be confused with those of the Marcellus formation of the Devonian,[4] the Oriskany of the Upper Silurian, or the Trenton of the Lower Silurian. The deposits of all these formations are mined extensively in Pennsylvania and Virginia, and in a general way are similar to those under consideration. The ores of the Cripple Creek district of Virginia, which is within 50 miles southeast of Shady Valley, are the only ores of similar geological environment that have been extensively developed in southwestern Virginia and eastern Tennessee.

In the Cripple Creek region the ore-bearing limestone is classed by D'Invilliers and McCreath as Cambro-Silurian No. 11,[5] the accompanying shales and sandstones as Knox No. 11, and the quartzite as Potsdam sandstone No. 1.[6]

The Shady limestone is probably included in the Knox group, the Erwin quartzite, Hampton shale and Unicoi formation being part of

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[1] U. S. Geological Survey, Cranberry Folio, 1903, pp. 4, 5.

[2] The composition of the ores at Shoun's Cross-roads is as follows:

They are essentially limonite, with some clay and silica.

Iron	48.27 per cent.
Silica	15.75 "
Manganese	0.69 "
Phosphorus	0.320 "

Analysis by F. A. Genth, Jr., of Philadelphia.

[3] U. S. Geological Survey, Cranberry Folio, p. 5.

[4] B. S. Lyman, *Trans.* A. I. M. E., 1886, Vol. XIV, p. 801.

the Chilhowee sandstone formation of Safford's classification.[7]

As Shady Valley is approximately a spoon-shaped basin with its point terminating at the northern end in a narrow gorge, it has afforded ideal conditions for the accumulation of iron deposits on its limestone floor; moreover, its only drainage outlet being so small and choked, little opportunity has been afforded for destructive erosion. In consequence of this peculiarity the clay beds in the basin not only cover the entire bottom, which has a probable area of some eight or ten square miles, but their depth has never been definitely ascertained. It undoubtedly varies within wide limits, owing to the cavernous character of the limestone, the clay filling great pot holes and depressions in it that may extend several hundred feet down. At some places, however, the limestone rises quite or nearly to the surface, and can be reached after removing a few feet of soil. That the entire bottom of the basin is limestone (Shady) has not been ascertained, but it is highly probable since it is the upper formation of the synclinal fold that makes the valley. Where there has been considerable faulting, as in the upper part of the basin, the other formations, notably the quartzite, are much in evidence. The valley clays are derived from the decomposition of the Watauga shales and the Shady limestone, those richest in iron being found near the junction of this limestone with the quartzite. They vary in color from white, pink, red and vinous shades of yellow. The ore is found only in the yellow, which sometimes possesses a greenish tint when carrying fine ore. The yellow clays are often fat, unctious, contain large quantities of quartz grains and crystals, besides sand composed of quartzite and sandstone grit. Much of the silica has undoubtedly been deposited in situ along with the iron.

The clay beds are usually covered with from one to 30 ft. of detrital material, composed of rounded pebbles and boulders of sandstone, quartzite with clay and humus. The pebbles, boulders and much sand are sometimes cemented together into a hard conglomerated mass by secondary depositions of iron oxide. This material has often the appearance of an orebody, but it is too lean to be of value, and is unusually hard, requiring the use of explosives for its removal, so that its presence over the ore-bearing clay is a nuisance.

The presence of iron ore in these clays is decidedly irregular, the continuity of the ore-bearing material being interrupted by beds and masses of white, pink or light yellow clay that contains no ore. It often happens, however, that under these barren places good ore-bearing clay will be found. At greater depths than have as yet been reached it is not unlikely the ore-bearing clay may be less irregular, but near the surface these barren places must be reckoned with.

The depth or thickness of ore-bearing clay beds has never been determined in Shady Valley; shafts 40 to 50 ft. deep have been sunk into them without reaching rock (limestone) bottom. The probabilities are they vary greatly in this particular, owing, as previously intimated, to the cavernous character of the basal limestone. One thing seems fairly certain, that the ore-bearing clays reach as great a thickness as the barren clays. In several instances shafts 30 to 50 ft. have penetrated beds, carrying ore from top to bottom, or at least from within two or three feet of the top.

Where the larger masses of ore predominate it is not unlikely they represent a replacement of the limestone by iron-bearing solutions rather than ordinary bog-ore deposits. According to Hayes, in the Carterville district of Georgia, the larger proportion of concentration deposits are situated near the contact of the limestone and the quartzite, and under favorable conditions such deposits may extend to a depth of 100 feet or more.[8] The same authority states that deposits associated with faults and fissures are undoubtedly the deepest of all. "Such were probably formed by solutions ascending from considerable depths, hence may extend downward several hundred feet, although the character of the ore would undoubtedly be found to undergo some change in depth, the oxide being accompanied by increasing proportion of sulphide, and perhaps carbonate. In all cases the iron has been transported to a greater or less distance from the beds in which it was originally disseminated." Whether the largest orebodies in Shady Valley will be found near the quartzite is as yet uncertain; it is likely such may be the case, since the valley basin receives the drainage of the adjacent rocks, which constitute the surrounding mountains, and the widely disseminated iron leached therefrom during the process of decay has been transported to the limestone valley and there concentrated upon the underlying impervious quartzite.

The precise nature of these deposits, as well as their geological age, has been the subject of much speculation and some misconception. An adequate solution of the problem involves difficult questions of chemistry, mineralogy and geologically stratigraphy, which as yet can be explained only in part.

The Shady Valley ores, in both the concentration and fault deposits, are essentially limonite; their occurrence is massive, earthy, concretionary, nodular and occasionally stalactitic. Color of surface and fracture exhibit various shades of brown, usually dark and none bright. The streak is generally red to yellowish brown. The concretionary or nodular forms are most common, often occurring in hollow spherical masses, sometimes called pot or bomb-shell ore. These hollow lumps frequently contain water or masses of unctuous clay; the interior surface has a glazed appearance, resembling a coating of varnish or black lacquer. Sometimes these lumps are more or less solid, the interior presenting a honeycombed or vesicular appearance.

Concretionary structure is the prevailing characteristic of the ore, the concretions varying in size from the finest grains to masses several feet in diameter. This material constitutes the bulk of what is known as 'wash ore,' that is, it yields a merchantable product after having passed through the mill or washer that separates and removes the ore particles from the accompanying clay. The clays also contain masses of lump ore, which is usually found from 10 to 25 ft. below the surface, being nearly always overlaid, as well as underlaid, by wash ore. This lump ore often consists of solid masses up to five or six feet thick, and carries no gangue except the clay occupying small seams and cavities in the mass, so that when the lumps are washed they generally present a more or less honeycombed appearance. Then again the massive ore has a laminated structure and breaks in distinct layers like an onion. These partitions invariably contain some yellow clay; in fact, clay frequently is the only mechanically combined impurity contained in the massive ore, except some manganese oxide that at times occurs with the clay as a black smut (probably the mineral wad), which is mostly removed in the washing. This material must not, however, be confused with the hard manganese oxide (pyrolusite) that is chemically combined with the iron, or separately deposited in a pure state and intercalated with the iron ore.

The presence of free silica is of course much greater in the wash ore than the lump; this is to be expected from the fact that the silica is probably deposited contemporaneously with the iron oxide. It is impossible to accurately state the proportion of wash ore to lump; it varies greatly.

Pechin states that with the Virginia brown iron ores, there is fully two-thirds wash material, and the latter is always high in silica.[9]

Some idea of the composition of the Shady Valley ores may be obtained from the accompanying table. Some of the samples were taken from surface outcroppings, where they had been well washed by the rains for many years, consequently the percentage of iron is higher and the silica lower than is ordinarily obtained as an average result with mechanical washers, with which 48 per cent iron and 10 to 12 per cent silica must be considered excellent practice.

Nos. 1, 8, 9, 12, 37 and 42 of the table are considered 'fault deposit' or 'mountain ores'; all the others are from concentration or segregated deposits, or, as they are sometimes denominated, 'limestone ores.'

No.	Iron.	Manganese.	Phosphorus.	Silica.
3	56.37	0.394	0.168	4.92
5	47.57	7.410	0.055	2.50
6	57.20	0.394	0.046	3.80
7	57.56	0.789	0.115	2.24
15	44.73	3.72	0.114	14.61
18	47.05	0.87	0.224	14.33
19	57.80	0.33	0.08	4.75
21	53.30	0.45	0.14	10.20
24	60.75	1.25	.....	.....
34	48.85	0.24	0.14	12.60
35	47.15	0.84	0.13	12.65
39	57.27	1.02	0.044	2.90
1	58.53	0.366	0.252	6.15
8	57.26	0.225	0.185	5.25
9	57.22	0.084	0.285	7.72
12	54.16	0.141	0.907	5.83
37	50.35	0.12	1.02	12.00
42	54.70	0.03	0.11	.....

A careful scrutiny of these and many more analyses reveals certain peculiarities which are worthy of note. Thus the mountain or fault deposit ores exhibit a disposition to run comparatively high in phosphorus and low in manganese.

This tendency in certain magnetic ores was observed by McCreath, who attributed it to the presence of associated slaty material, in which he detected an appreciable amount of phosphorus.[10]

In the Shady Valley, as in all similar ore deposits throughout the Appalachian system, the content of manganese is exceedingly variable, the iron being replaced by manganese

[6] The term Cambro-Silurian, signifying that the ores occur partly and jointly in both these formations, is no longer in use, Silurian now being more generally called Ordovician. This formation is included in the Trenton group of the classification of the Second Pennsylvania Geological Survey, that is, it includes all the Ordovician below the Utica shale. The lower portion of the series, including slates and quartzites, was formerly, but probably incorrectly, correlated with the Potsdam of New York. See T. C. Hopkins, *Bulletin* of the Geological Society of America, Vol. XI, p. 476.

[7] Cripple Creek Mineral Region, *Report* published by Norfolk & Western Railroad, 1887. *Trans.* A. I. M. E., Vol, XV, p. 734; *Trans.* A. I. M. E., Vol. XII, p. 17.

[7] Geology of Tennessee, 1869.

[8] C. Willard Hayes, *Trans.* A. I. M. E., 1900, Vol. XXX, p. 414.

[9] *Trans.* A. I. M. E., Vol. XIX, p. 1,021.

[10] *Trans.* A. I. M. E., Vol. XII, p. 24.

or conversely manganese by iron; probably the former action takes place most frequently.

Pechin gives the following extremes of composition derived from many hundreds of analyses of 'brown hematite' or limonite ores, covering a great section of the Appalachians, extending from Maryland to Tennessee.[11]

Metallic iron, from 38 per cent in wash ore to 57 per cent in picked lump.

Silica, from 22 per cent in wash to 3 per cent in picked lump.

Manganese, from 0.10 per cent to any per cent.

Phosphorus, from 0.10 per cent to 3.5 per cent.

Alumina, from 0.5 per cent to 3 per cent.

Lime, under 0.75 per cent.

Magnesia, under 0.50 per cent.

Sulphur, as an almost invariable rule, in hundredths of one per cent, or inappreciable.

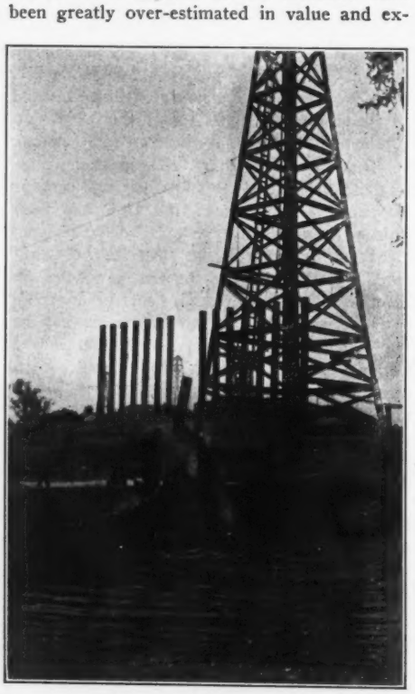
This generalization regarding the composition of these ores cannot be bettered. It will be observed that Shady Valley ores in character and composition, are no better nor worse than the general average of ores of similar kind throughout the Appalachians.

In mining ores of this class the chief desideratum is to prepare them for market as free from clay and silica as possible. When we consider that the general average of the ore used at Roanoke, Va., furnaces is 42 per cent iron,[12] and, according to Pechin, at other localities as low as 40 per cent iron,[13] it is evident from this that the preparation is often careless, wasteful and imposes a needless burden on the furnaces. The fine ore below one-eighth inch is usually wasted at most washers and by crowding them in order to obtain a large production the clay and silica are but partially removed. In fact, I have been informed by the chemists of some southern furnaces that 39 per cent iron is the usual average of the limonite ores as received at the furnace.

If the rains will wash surface lumps so thoroughly that they will yield over 50 per cent iron on analysis, surely a figure between 42 and 50 per cent is not too much to expect with good practice in a well-equipped ore-washing and -dressing plant.

The economic importance of these brown iron ores cannot be over-estimated, especially in the southern states. Of late years they do not appear to have received the attention and scientific study they deserved, though in the past they were of paramount importance, having been the original foundation of the present great iron and steel industry of Pennsylvania. Gradually with the introduction of richer Lake Superior and imported ores, conditions changed; the brown or limonite ores could not compete, and their production in Pennsylvania became a moribund industry. In the southern states, especially Virginia, Tennessee and Alabama, protected by a greater distance from Lake Superior, with cheaper labor and other favorable conditions, these ores promise to be the very backbone of the local iron industry. Therefore they deserve renewed attention, even if this goes no further than a refurbishing of such old and well-established facts as are now buried deep in old publications and long since forgotten. New data and free discussion of the subject will be most welcome.

There is possibly no class of ore-deposits more misleading and difficult to understand than those considered in this paper. Much money has been lost through misconception of their value, though at first sight they seem so simple that any tyro would be capable of forming a reliable opinion regarding them. That such is an error may be readily appreciated from the remarks of the late J. P. Lesley, an American geologist of the first rank, in his paper on 'The Brown Hematite Ore Banks, in Huntingdon and Center counties, Pennsylvania,' where he states that "one of the most noticeable features of this iron district (and of others similar) has been denials of the existence of any ore just where the deposits were proved by subsequent diggings to be most copious, and predictions of the speedy exhaustion of ore-banks which steadily grew in magnitude as the excavations spread."[14] On the other hand, we have a number of instances, especially in the South, where deposits of this character have been greatly over-estimated in value and extent, with consequent disastrous results. In brief, it is an economic subject of the highest importance, worthy of more scientific study and attention than has been hitherto given; and as the richer supplies of iron ore become exhausted, it is certain to demand ever increasing attention if the iron and steel industries of our eastern states are to be maintained at the localities where they are now established.



PUMPING MELTED SULPHUR.

GRAPHITE IMPORTS.—Imports of graphite into the United States for the eight months ending August 31 were 8,790 tons, showing a decrease of 2,882 tons as compared with the corresponding period last year.

ZINC AND LEAD IN BULGARIA.—According to a recent report, deposits of zinc and lead ores of considerable extent have been found near Bosilegrad, in Bulgaria, and their exploitation has already been undertaken by an Italian company. The ores are shipped to Austria and Germany for reduction.

REVIVAL OF THE AMERICAN SULPHUR INDUSTRY.

Last year's consumption of sulphur in the United States was the record—508,578 long tons—but of this quantity domestic sources yielded only 122,126 tons, or 24 per cent, principally in the form of iron pyrite. Of the 386,452 tons, or 76 per cent, purchased abroad, the Sicilian brimstone combination furnished 152,876 tons, or 39 per cent, and the Spanish pyrite mines the greater part of the remainder. Foremost among the American consumers are the manufacturers of the sulphuric acid used in the refining of petroleum and for the preparation of artificial fertilizers. The paper mills are also important consumers. These three industries have ranked this country as the largest consumer of sulphur in the world.

There are practically only three commercial deposits of brimstone in the United States—Louisiana, Nevada and Utah. It is in the former State that the revival in sulphur mining promises to put America in an independent position as regards this important raw material. The operations in Louisiana were inaugurated in the early '80s, and the checkered career of at least four incorporated companies no longer in existence has made an interesting history for a unique sulphur deposit. The Louisiana sulphur occurs principally in carbonate of lime, is rich, and most accessibly situated in Calcasieu parish, 230 miles west of New Orleans, 12 miles from Lake Charles, and 16 miles from Sabine Pass. The first explorations were for petroleum, but when the sulphur was discovered a shaft was sunk on the Kind-Chaudron system, and several other processes were tried. Sinking by shaft proved costly, and the great difficulties, encountered in development in the wet and soft quicksand and gravel, necessitated the abandoning of the work. On the other hand, the high wages current in the United States would make any sulphur mine worked by a shaft an unprofitable venture, in view of the low costs of labor in Sicily, and the cheaper ocean freight to New York, compared with the high railway rates to interior points in America. Consequently the unique method suggested and patented by Mr. Herman Frasch in 1891, which consists in melting the sulphur in the ground and removing it to the surface in melted condition, has, after years of employment, made it possible for American sulphur, produced under American conditions, to compete successfully with Sicilian. In fact, Mr. Frasch states that the cost of production is low enough to export to Sicily and sell there at the Sicilian's cost.

The Frasch process consists in drilling a well precisely in the same way as for petroleum. This is cased with an iron pipe 10 in. in diameter, which enters the rock overlying the sulphur bed a distance of 10 ft. Inside of the 10-in. pipe is placed one of 6 in. diameter; inside of the latter one of 3 in., and finally inside of the 3-in. pipe one of 1 in. diameter. The well itself is carried down to the bottom of the sulphur bed, and the 6-in. and smaller pipes are dropped nearly to the bottom of the hole. Water heated to 330° F. is forced down the pipes under a pressure corresponding to that temperature, and in coming in contact with the sulphur-bearing rock, the sulphur melts and collects in the bottom of the well as a thin liquid of about sp. gr. 2. Sulphur being insoluble in water, pure liquid sulphur only is forced to the surface. Instead of pumping as for petroleum, compressed air is forced down the 1-in. pipe, and the bubbles of air

11 *Trans.* A. I. M. E., Vol. XIX, p. 1027.
12 Catlett, *Trans.* A. I. M. E., Vol. XXIX, p. 308.
13 *Ibid*, Vol. XIX, p. 1021.
14 *Proceedings* American Philosophical Society, 1874, Vol. XIV, p. 32.

mixed with the sulphur reduce the specific gravity of the column of sulphur and it rises with great rapidity. The sulphur-bearing rock is similar to petroleum rock. Mr. Frasch says that, in addition to the sulphur, there exists in the rock remnants of the sulphur water that furnished the source of the sulphur itself. This sulphur water in volume is greater than the sulphur existing in the rock. It is this

BOILER HOUSES AND SULPHUR TANKS.

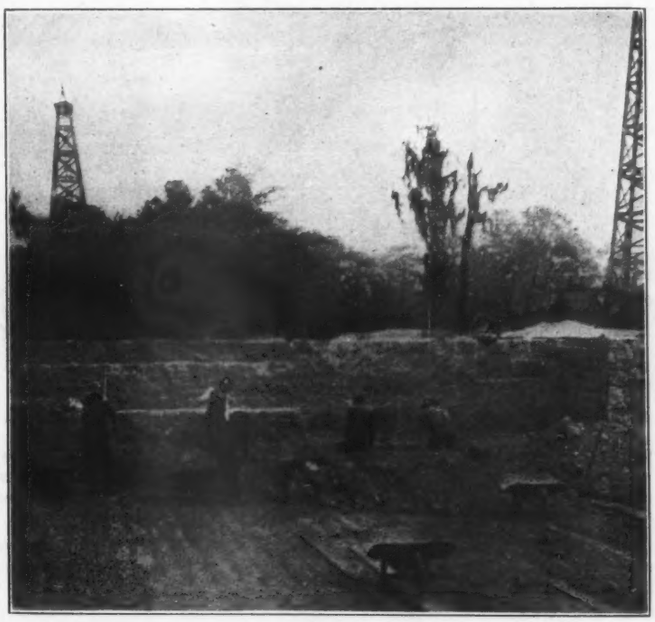
water present in the rock that created the difficulty of working the deposit. When the cavity becomes so large that the sum total of the sulphur water influx is larger than the hot water forced into the mine, cold water flows into the cavity and the well diminishes its production until the influx of water has become so great as to counterbalance the hot water which has been introduced. The quantity of water introduced has at times been so large that the water in the rock has been heated up, and, on account of its higher temperature, has proved less detrimental, so that the output of sulphur has increased from 2,000 tons to 23,000 tons per well. When the whole rock is thoroughly heated the cavities of wells will not be material. At present there is sufficient heating capacity at Sulphur Mine to operate two wells with a daily output of 500 to 700 tons of sulphur. The maximum daily production of one well is 550 tons, and the record for 2 wells is 850 tons. The average monthly production is between 15,000 and 16,500 long tons of sulphur, which is stored in large reservoirs, mostly 72 ft. square by 14 ft. deep, as shown in the accompanying illustrations. The Union Sulphur Company, capitalized at $200,000, has 36 boilers, of 150 h.p. each, using 1,200 bbl. petroleum daily to operate two wells. Another well is to be sunk. Calculating on the present monthly output, Louisiana this year will very likely show a total of nearly 200,000 tons of sulphur. Ruling prices are $21.20 to $21.45 per long ton for Louisiana seconds, and $21.50 to $21.75 for prime 99.5 per cent sulphur, delivered at New York, Baltimore, Philadelphia, or Portland, Maine.

IRON ORE IN ONTARIO.—It is stated that a valuable iron deposit has been found at Temagami, close to the line of the Temiskaming & Northern Ontario railroad. Messrs. B. O'Connor, of Temagami, and T. N. Caldwell, of Lanark, are interested in this deposit, and development work will be begun soon.

ELECTRICALLY DRIVEN AIR COMPRESSORS.*

The recent and rapid extension of electric power transmission systems, making electric power available in localities heretofore dependent upon local fuel, has opened up a field for the electrically driven air compressor. The conditions in the average mining districts are not favorable to economical production of power. High fuel cost and scarcity of suitable boiler water are usually characteristic of the mining camp. These conditions are steadily growing worse, as forests are depleted for fuel, and tunnel enterprises drain the country. Long and difficult hauls usually make cost of coal prohibitive. Added to all this must be considered the general tendency of mines toward lower grade ore, necessitating operation on a thorough business basis, with careful attention to small economies. The advent of the power transmission lines into the mining districts, making available at small cost the energy of distant water-falls, is rapidly solving the problems imposed by the conditions outlined above. Many of the larger mining companies have secured water powers and installed transmission systems of their own; many more buy their power from larger installations. But whether electric power is made or purchased the problem which sooner or later confronts every mine manager is that of converting the electric power into compressed air to drive his mining drills. For electricity, wide as is its field of usefulness, has not yet been able to displace the air drill. Until a successful electric drill is placed on the market, the demand for compressed air for mining purposes will exist and must be satisfied.

The first problem to be considered in this connection is that of the size of compressor units installed, for the modern mining plant is designed along the lines of up-to-date engineering practice which demands that the plant as a whole be operated at maximum economy. Mining practice necessitates a variable day load, and the best way of meeting this condition economically is by the installation of separate and independent compressor units, the number of which in operation at any time may be increased or diminished with changing load. This enables each unit-compressor and motor to be operated at or near its highest efficiency throughout the day, as recorded by the watt-meter at the end of the month. It may be stated broadly that it rarely pays in mining work to instal a motor-driven compressor under 25-h.p. When a 100-h.p. installation is required, the best practice would be to divide it into three units of 35-h.p. each, or two of 50-h. p. each. For installations of from 100 to 500-h.p., like subdivisions into two or three units aggregating the total capacity, would be the best practice. When the size of installations ranges from 500 h.p. up, separate units should be installed of proper size. It is not advisable to exceed 1,000 h.p. in a single unit, however. These are mere suggestions. No fixed rules can be laid down; local conditions, nature of load, etc., must in each case be considered.



TAKING SULPHUR FROM THE TANKS.

Two forms of electric power must be con-

*From *Bulletin 101*, published by Harron, Rickard & McCone, San Francisco.

sidered—direct and alternating current. The nature of the current available must, of course, determine the character of motor used, method of control, etc.

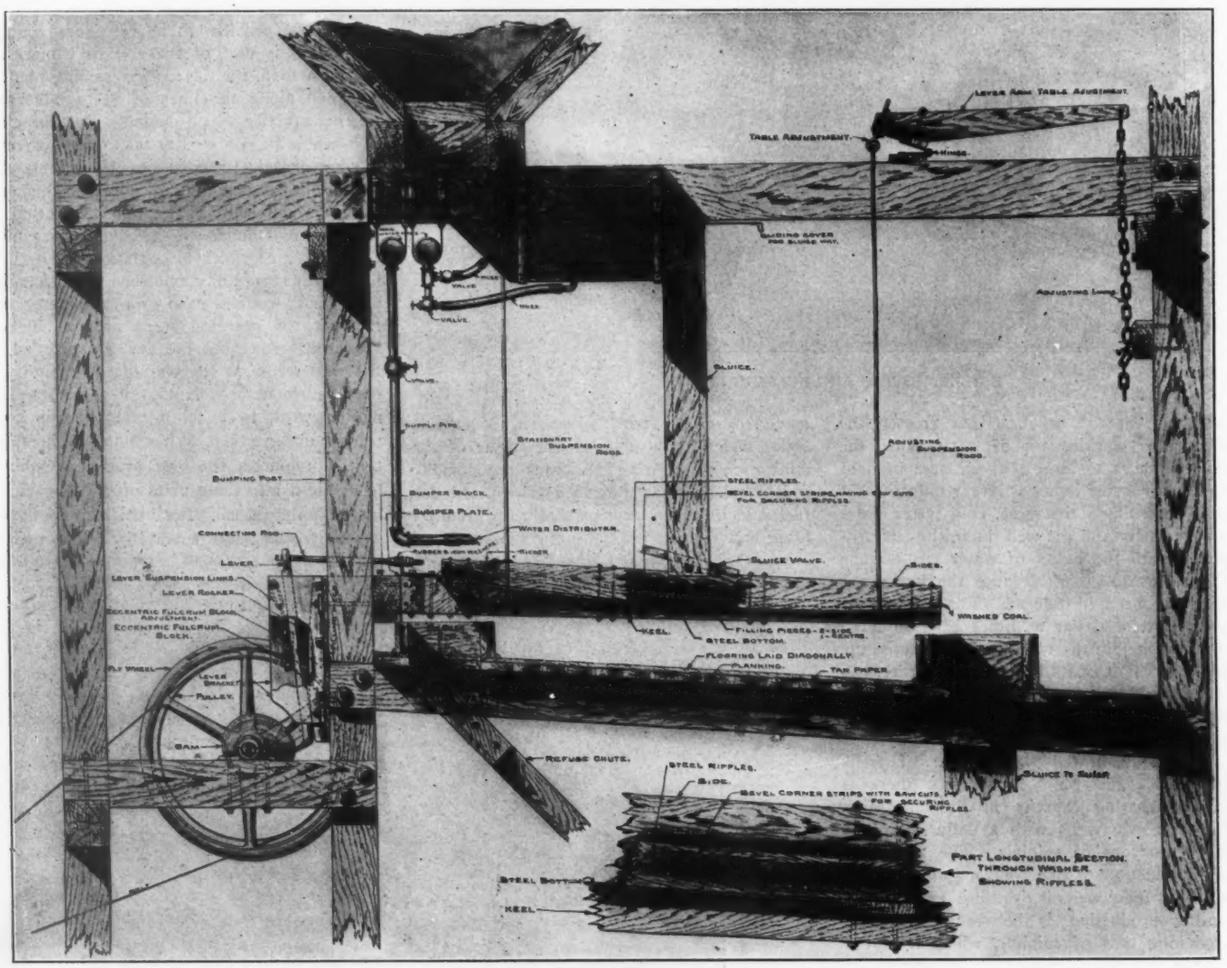
Since we are discussing electrically driven machinery for mining purposes, the first class of power—direct current—need merely be touched upon. For in the vast majority of cases, power is secured from transmission systems demanding, in the very nature of things, the use of alternating current. A feature characteristic of the direct-current motor is that it may be operated at variable speed, and may build up its load gradually. This feature is of small value in mining work and certainly justifies no extra outlay for installation of current-transforming devices. The methods of drive and governing will be practically the same for direct current machines as for alternating.

When alternating current is available, two forms of motor may be used—the synchronous and the induction. The first has the serious disadvantage of requiring a separate motor to bring the main motor up to speed before the load is thrown upon it. It will not start under load. Once speeded up and loaded, it is essentially a constant-speed machine and will maintain its speed regardless of load. It has the further advantage of requiring no excess of current at starting—a feature of value only when the current available is limited in quantity, or when the resulting unbalancing effect would have serious results on other parts of the electric system. It may be stated broadly that the synchronous motor has no place in the isolated electrically driven mining plant, except in those rare instances, where it may be desirable to so arrange the system that the motor may be driven as a generator, furnishing current to the system at times when the prime source of power is inadequate.

The induction motor is the machine which lends itself most readily to the average mining problem. Like the synchronous motor, it is practically a constant-speed machine, the variation seldom running as high as 10 per cent. It is self-starting, and unless started under full load it demands no excessive in-rush of current. It is simplicity itself and requires no attention. It is essentially self-governing and has a high efficiency. It is almost the ideal motor for use on the polyphase systems which are so general throughout the country.

Five methods of electric drive for compressors may be used, direct connection, direct gearing, belt, rope, and chain drive. The first—the armature of the motor mounted on compressor shaft—is the ideal arrangement with duplex type of machine where the unit is large enough to make the speed suitable. Direct gearing finds its highest value in places where floor space is very limited. The motor is usually mounted on the extended compressor bedplate. This method has the disadvantage of low mechanical efficiency. Belt or rope drives are valuable in cases where ample belt-centers are available and floor space is not an important consideration. The silent chain-drive is coming to the front because of its simplicity, reliability and economy. A properly arranged chain-drive requires no attention or adjustment and transmission efficiency may run as high as 95 or 96 per cent. The chain-drive is not recommended for use about 200-h.p., and when this limit is exceeded rope drive may be used.

A properly designed electrically driven compressor plant may be entirely automatic in its control. With the sub-divided unit system and a properly organized plant, the only attention required from the attendant is cutting in or out compressor units as daily load curve rises or falls. The machines in operation will be entirely self-governing if suitable devices are installed.



CAMPBELL COAL WASHER.

COAL TRADE OF BELGIUM.—In the eight months ending August 31 2,376,695 tons of foreign coal were imported into Belgium, as against 2,317,439 tons in the corresponding period of 1903. There was also an increase in the exports of Belgian coal—from 3,044,637 tons to 3,188,413 tons. The imports of foreign coke in the eight months amounted to 217,962 tons, comparing with 199,380 tons in the first eight months of last year, while the exports of Belgian coke advanced from 541,455 tons to 576,156 tons. On the other hand, a decrease is noticeable in the shipments of Belgian briquettes, the exports having declined from 436,969 tons to 360,734 tons.

A MODERN METHOD OF COAL WASHING.

By C. A. MEISSNER.*

In washing coal we have to consider the following differences of specific gravity: Pure coal from 1 per cent to 1.3 per cent; slate, 2 per cent to 2.7 per cent, and iron pyrite, 3.1 per cent to 5.1 per cent.

The whole value of a washing machine lies in its ability to eliminate the sulphur and ash as largely as possible. The ash is largely formed from slate. The sulphur occurs in the shape of solid pyrite, and also more or less as organic sulphur, which, in our Nova Scotia coals, is in the definite amount of 1 per cent. This cannot be eliminated by washing. The great difficulty has been, heretofore, to eliminate the light, flaky particles of pyrite, which, in many coals, fill all the cracks with a yellow film, and yet are so thin that they have a tendency to float off with the coal. Solid pyrite, in crystals, or aggregates of crystals, is the easiest to wash out.

There is usually very little trouble in washing out the slate, though even here, in some styles of washers, there is always danger of the fine particles of slate being washed off with the coarser particles of coal unless great care is exercised in crushing all coal to less than 0.25 in. size. The greatest difficulty in many coal-washing plants has been the failure of many managers to recognize that successful results are dependent entirely on uniformity of size. A piece of coal 0.5 in. large requires a water pressure to carry it away that would carry away a piece of slate one-third its size, or a piece of pyrite one-fifth its size.

In the Campbell washer the fine, powdery coal has a chance to float away with the current of water mixed with coal, and can thus be saved in a form that makes it directly available. This table is controlled by Heyl & Patterson, of Pittsburg.

If the table were to be applied to ore and rock, the conditions would be, in most cases, similar, excepting that a much stronger current of water would be needed to carry away the specific heavier rock than the specific lighter coal, which it would represent, whereas the finer ore would act like fine pyrites and slate and pass through the riffles into the bottom built underneath.

At the plant of the Dominion Iron & Steel Company the raw coal is received as slack, varying in size from zero to one inch. This is dumped into a pit under the coal track and elevated to overhead bins. From these the raw coal is drawn and passed over a grizzly, which removes all coal from one-quarter inch to zero, the balance going to the four corrugated rolls, arranged in a single row, end to end, in pairs, which reduce the coal to not larger than one-quarter inch.

Beneath each pair of rolls is a hopper, into which all the coal passing through the grizzly is discharged. Elevators raise the coal to the long bin above the washers. The washers or beds are suspended from this bin, and each is provided with an adjustable chute, having a 1-in. water pipe at the point of junction of the chute to the bin. The object of this water junction is to stir up and sluice the coal down to the beds in uniform quantity. At the point of entrance of the water a small slide-valve is inserted, by which larger or smaller quantities of coal can be let down over the chute.

The beds are 9 ft. long and 30 ft. wide, and suspended at their four corners by rods. The head, or bumping end, is connected with a rod to a loosely-hung rocker arm, the free end of which engages a peculiarly designed cam, which is mounted upon a shaft driven by a motor or engine. This rocker arm is adjustable, so that one can give a longer or shorter swing to the bed.

The bed proper consists of a central timber or 'keel,' upon which are fastened crosswise five or six strips, 8 in. wide and 30 in. long. Upon these strips is fastened a sheet of galvanized iron. Upon this sheet of iron three narrow pieces are secured running lengthwise with the bed, one at the center and one at either end of the cross pieces, and upon these pieces in turn are mounted the riffles, constituting a false bottom. The riffles are triangular oak strips, and have an over-lapping strip of galvanized sheet iron fastened to them. They are set ⅛ in. apart, and this space communicates with the hollow space between the riffle and the sheet iron bottom of the bed. The sides of the beds are 6 in. high, and the whole resembles a trough with a serrated bottom.

The coal being sluiced to the bed with water, the bed soon fills, while the cam motion is such that the bed is brought at regular intervals of time, about 60 strokes per minute, against a bumping-post of heavy timber. This agitates the mass upon the table, allowing the heavier impurities to settle on the riffles. At each successive blow the slate and pyrites are made to move up towards the bumping end, the riffles all being set in that direction, until they are finally discharged over the end of the bed into the refuse sluice, while the lighter coal flows with water to the lower end of the bed in the form of a fan-shaped sheet, covering the whole width of the bed. Thus any larger pieces of coal which have a tendency to move up with the slate are washed back. The fine pyritic flakes and other pulverized heavy impurities pass down between the riffle spaces to the sheet-iron bottom, whence they are discharged.

The beds have a capacity each of five tons of washed coal per hour, making each bed's work in 10 hours equivalent to 50 tons. The amount of refuse, including what coal is carried with it, is about 45 per cent, so that each table washes about 72 tons of coal per day.

The raw coal, as it originally enters the tables, contains about 6.5 per cent of ash and 2 per cent of sulphur. As it leaves the tables it contains about 3 per cent to 4 per cent of ash and 1.2 to 1.4 per cent of sulphur. The refuse contains about 40 to 45 per cent of sulphur, the balance of about 35 per cent to 40 per cent being coal. This, on about 4 per cent of loss, means a total loss of about 0.7 to 0.8 of a ton of coal to each washing table per day.

To utilize the lost coal in the refuse, the amount can be raised in the washing to increase the loss to, say, 6 per cent, which will give a purer coal, but leave more coal in the refuse. This refuse can then be re-washed roughly on the re-washing beds, so as to get refuse practically free from coal, and a coal containing from 3 per cent to 4 per cent of sulphur and a proportionate percentage of slate, that is, 60 per cent to 70 per cent of coal, which can be used as a boiler fuel.

*Abstract from the *Journal* of the Mining Society of Nova Scotia, February 19, 1903.

Steel was made at 101 works in Germany in 1903, and the total output was 8,801,515 metric tons, chiefly by the Bessemer process.

THE CANADIAN BOUNTY ON LEAD.

The text of the Canadian order in council, which permits the application to exported lead ores of any unappropriated portion of the bounty on lead, is as follows:

"Whereas, by clause 3 of the Act 3, Edward VII, Chap. 31, intituled 'An Act to provide for the payment of bounties on lead contained in lead-bearing ores mined in Canada,' it is provided that if at any time it appears to the satisfaction of the Governor-General in Council that the charges for transportation and treatment of lead ores in Canada are excessive, the Governor in Council may authorize the payment of bounty at such reduced rate as he deems just on the lead contained in ores mined in Canada, and exported for treatment abroad, and

"Whereas, it appears that the lead smelters in Canada are unable at present to treat the whole of the lead ores mined in Canada, except at an excessive rate:

"Therefore, the Governor-General in Council is pleased to order that, after the payment of the full amount of bounty payable under the Act above referred to and amendments thereto, upon lead ores mined and smelted in Canada, and dating from the 1st day of April, 1904, until the 30th day of June, 1905, a rate of 50c. per 100 lb. of lead contained in lead-bearing ores mined in Canada, and exported for treatment to Europe, shall be paid, provided that the quantity of lead upon which such bounty shall be paid shall not exceed 11,000 tons, of 2,000 lb., in any one fiscal year."

LEAD IN ONTARIO.

According to the *Canadian Mining Review*, the existence of ores of lead in Ontario, Quebec, and Nova Scotia has been known for more than thirty years, and the various and spasmodic attempts which have been made to work these ores are of equally clear knowledge. The deposits in Tudor, Ontario, occur in calcareous and micaceous schists, associated with limestones and dolomites of Silurian age. Some of these deposits occur associated with a gangue of barytes and calc spar, and are small in extent, others are from 18 in. to 24 in. in width, the ore appearing in bunches and as disseminated grains in the gangue. Some larger masses of galena are occasionally found, but the characteristic of the region is a lack of continuity to the deposits.

In both Tudor and Lake townships there appear to be two distinct sets of deposits, one striking northwest, the other northeast, and where two veins cross each other there is usually an enlargement at the surface which does not continue in depth. There are, in addition, other veins, usually with a quartz gangue, which are somewhat larger, and which cut through the gniesses of Elzevir township.

The association of arsenical and antimonial ores with the galenas of this section is not infrequent; their values in silver are low, running from 3 to 8 oz. of silver to the ton of galena, and the majority of samples show no gold whatever.

RUSSIAN COAL MINES.—The production of the coal mines in the Dombrowa basin (Poland) in 1903 amounted to 4,747,812 metric tons, against 4,232,287 metric tons in the previous year. There were 27 mines which contributed to the output.

BOOKS REVIEWED.

Encyclopedia of Mexican Mining Law. New Edition, 1904. By Richard Chism. Mexico: Published by the author. Pages, 204. Price, $2.

This is a new edition, revised and corrected up to date, of an excellent manual, which will be very useful to the many who have investments in Mexican mines, or are thinking of making such investments. It contains a digest of the Mexican mining code, with all the explanatory circulars and supplementary enactments and decrees serving to modify the original code. It is carefully indexed and accompanied by a glossary of Mexican mining terms. The material is condensed and well arranged, so that references to any point can be quickly and easily made.

Modern Practical Electricity. Electricity in the Service of Man. Volume IV. By R. Mullineux Walmsley. Chicago: W. T. Keener & Company. Pages, 328; illustrated.

This volume of an elaborate work contains six chapters, the first being on the magnetic circuit; the second on batteries of generators; the third on continuous current motors; the fourth on dynamo and motor testing; the fifth on alternate current motors, and the sixth on electrical measurements. It begins abruptly, both matter and paging being carried over from the preceding volume, while there is nothing to show whether this is the concluding volume, or whether more is coming. This is annoying to the reader, and is adopted from a bad fashion, common with German publishers, but, fortunately, little in use here. The fact that an index to the four volumes is given may, however, be taken as an indication that this is the last. Mr. Walmsley's descriptions of electric apparatus are elaborate, and are very fully illustrated. They are accompanied by occasional discussions and demonstrations, and considerable space is given to theory. It is a book for the expert electrician, rather than the student, or the engineer who is not an electrician.

Types and Details of Bridge Construction. Part I. Arch Spans. By Frank W. Skinner. New York: the McGraw Publishing Company. Pages, 300; illustrated. Price, $3.

This book is, in part, a reprint of a number of descriptive articles, which originally appeared in the *Engineering Record*. They have here been revised, and new matter added. Its purpose is to show the development of advanced practice, both in general type and details, and to put on record a number of illustrations, drawn from structures of the selected types. Explanations and comparisons have been added, to show the important features of the various designs. The bridges described have been arranged in order and grouped in classes, though it is not claimed that the classification is absolute. It is, however, difficult to illustrate various types, and a wide range of variation in details is shown. Criticism is not generally made, except so far as comparisons may induce it. The descriptions are, in most cases, supplemented by references to other articles which may have been published, so that the reader who wishes to make an extended study of any special work can do so without difficulty. The descriptions are clear and generally concise; the illustrations are good, and the mechanical work of the book has been well done.

Geology Applied to Mining. By Josiah Edward Spurr. New York, 1904: The Engineering and Mining Journal. Pages, 326; illustrated. Price, in cloth, $1.50; in morocco and thin paper for field use, $2.

The title page says that this book is "a concise summary of the chief geological principles, a knowledge of which is necessary to the understanding and proper exploitation of ore-deposits." The volume carries out this purpose. It is the work of a geologist who is already well known by his contributions to technical literature, for his ability to write clearly and for a close sympathy with those who delve amid the darkness underground. Wide acquaintance with mining engineers and mine managers has enabled Mr. Spurr to know how to collect in a convenient form those portions of geological science which have the most direct bearing upon practical mining. Hitherto, save for books relating solely to a description of ore deposits, such as Kemp's admirable treatise, there has been a lack of the particular information which the miner needed. In descriptions of ore deposits which he read in books or technical papers there was the general assumption of preliminary acquaintance with the principles of geology. It is this necessary outline of the subject which Mr. Spurr now gives him in a form which will, we believe, prove readily assimilated. Among miners and students, the quest for knowledge prompts the asking of questions, the answers to which fill many big volumes; in this little book the natural queries of the miner are placed in the form of question and answer. This crystallizes many of the problems which suggest themselves to him in his daily work and gives him the outline of a reply which, if he is further interested, he can find amplified by the authorities quoted by the author of this book. Mr. Spurr has been liberal in quotation and careful in acknowledgment. To many readers the complete references he gives will prove of particular value.

Chapter I gives a general idea of the nature, and mode of formation, of orebodies. This introduction compresses into about twenty pages the most recent views on the subject. In the next chapter the arrangement of the stratified rocks, as they affect mining, is considered; and in Chapter III igneous rocks receive similar treatment. Structural geology, with particular reference to the earth movements which have prepared a place for the deposition of ore, is treated in the next chapter, the longest in the book—and properly so. Chapter V is devoted to chemical geology, a branch of the subject on which elementary information will be particularly useful and which Mr. Spurr has handled with skill. The last chapter is a brief outline of the relation of physiography to mining. A full index closes the book, and adds materially to its usefulness.

The general style is good, clear and simple. Literary treatment was not called for, nor was it possible by reason of the question-and-answer arrangement adopted. Explanations of ore occurrence are aided by numerous excellent drawings. The text is clear, and the book is attractive in general appearance. The reviewer is bound to add that in printing, paper and general style this book marks a distinct advance on any publication hitherto issued by The Engineering and Mining Journal or the Scientific Publishing Company.

We can commend this book as likely to prove a useful friend to those engaged in mining. To the student it gives the outlines of a fascinating subject; to the miner it affords in digestible form a general idea of the scientific view underlying the application of geology to ore occurrence; and to the investor, director and general reader this convenient volume offers, in attractive shape, a carefully prepared summary of that vast field of human enquiry which underlies the finding of those mineral riches upon which modern civilization so largely depends.

BOOKS RECEIVED.

In sending books for notices will publishers, for their own sake, and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this Journal.

Rock Excavation Methods and Cost. By Halbert Powers Gillette. New York: M. C. Clark. Pages, 376; illustrated. Price, $3.

State Demurrage Rules; with Digest. Compiled by John B. Daish. Chicago: the *Grain Dealers' Journal*. Pages, 72. Price, $1.

The Story of American Coals. By William Jasper Nicolls. Philadelphia and London: the J. B. Lippincott Company. Pages, 396; illustrated. Price, $2.

Radium in an American Ore. By Alexander H. Phillips. Princeton, N. J.: Reprinted from *Proceedings* of the American Philosophical Society. Pamphlet, 4 pages.

Mysore Geological Department. Records, Volume IV, 1903. W. F. Smeeth, State Geologist. Mysore, India: Published by the Department. Pages, 180; with maps.

Die Stellung der Deutschen Eisenindustrie auf dem Weltmarkt. By A. Weiskopf. Leipzig, Germany. Reprinted from *Zeitschrift für Angewandte Chemie*. Pamphlet, 24 pages; illustrated.

The Elements of the Differential and Integral Calculus. By Donald Francis Campbell. New York: the Macmillan Company. London: Macmillan & Company, Ltd. Pages, 364. Price, $1.90.

United States Geological Survey. Production of Copper in 1903. By Charles Kirchhoff. Pages, 44. *Production of Zinc in* 1903. By Charles Kirchhoff. Pages, 16. Washington: Government Printing Office.

Monopolistic Combinations in the German Coal Industry. By Francis Walker. New York: Published for the American Economic Association by the Macmillan Company. Pages, 336. Price, in paper, $1.25.

PRODUCTION OF CLAY MATERIALS IN 1903.—According to statistics compiled for the United States Geological Survey, by Mr. Jefferson Middleton, the total value of the various clay products manufactured in the United States last year was $130,962,648. This total was made up of the following items: Common brick, $50,532,075; front brick, $5,308,908; paving brick, $6,453,849; fancy brick, $892,256; fire-brick, $14,062,369; drain-tile, $4,639,214; sewer pipe, $8,525,369; terra cotta, $4,672,028; fireproofing, $2,708,143; hollow blocks, $1,153,200; tile other than drain-tile, $3,505,929; pottery, $25,436,052; miscellaneous, $3,073,856. As compared with the output for 1902, there was an increase of $8,793,117.

The first electric winding plant erected in Austria was put in operation at the Tollinggraben collieries in December, 1903.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the Editor.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Tube Mills on the Rand.

Sir—With reference to the letter of Mr. Stamm in your paper of September 15, in which he refers to us and to the output of the Davidsen mill, this gentleman might have gone considerably further and stated that, whereas we originally adopted the Krupp tube mill, it was the result of very careful tests, and the experience of our friends of the Waihi and elsewhere, which proved to us that the Davidsen mill, the original mill, was so much superior that we had to adopt it.

THE CYANIDE PLANT SUPPLY COMPANY,
REGINALD KRALL, Manager.

London, Sept. 28, 1904.

Spelter and Zinc Ore Prices.

Sir—The zinc ore situation in the Joplin region seems to be in an anomalous condition. Since the little spurt which followed the recent exports of spelter, prices have remained about on a level. Now, when wheat advances, flour follows it; when cotton goes up, cotton goods must rise. It is the same in every item of trade except spelter, and it looks as if that, too, must follow the rule sooner or later.

Your Joplin correspondent, in one of his letters last July, says: "Summing up the situation, zinc ore will be so scarce the balance of the summer that it will cost the smelters high for a supply, and compel them to ask for a higher metal price." The later reports show that this prediction was correct. Zinc ore has gone up from $37 to over $50 per ton. If this price can be held, smelters will be forced to ask higher prices for metal. The question is, whether they can do so without checking sales.

Shipments of spelter from St. Louis east for nine months this year were greater by 7,340 tons than in the corresponding period last year. I do not believe that the consumption has increased to that extent. But the shipment of 5,000 tons abroad has relieved the market of any surplus stocks which have been weighing on it, to the detriment of prices.

The demand from abroad seems good, and foreign purchasers would take more metal if they could get it at a sacrifice; but I cannot believe, with the showing the steel industry is now beginning to make, with every avenue of business in this country looking well for the future, that the smelters can afford to make an additional concession to export more metal. I see in your issue of September 22 a report from Cartagena, Spain, of a similar condition in the ore market of that country, Messrs. Barrington & Holt writing that medium and choice grades of blende are selling out of all proportion to the metal market. These high prices for zinc ore in the Joplin district and in the Cartagena district do not look as if the western ore in the United States was meeting the full demand that has been placed upon it.

The fact of the matter is, that aside from three domestic smelters, none of the others has secured enough western zinc to charge a retort, or else they have changed their minds about wanting it. Two new gas smelters were started the past summer on Joplin district ore, which, it was said at the time of building, would fire on western ore, and two coal smelters were restarted on Joplin ore, after it was given out that they were to be started on western ore.

It is understood that the New Jersey Zinc Company, operating in Kansas as the Prime Western Spelter Company, has the control of all the zinc ore produced from the mines of the Guggenheim or American Smelting & Refining Company and associate properties, and that the Lanyon Zinc Company has contracts for nearly all the balance of the western ore that can be used for the manufacture of spelter. More western ore is being exported this year than last, mainly of a grade good only for converting into oxide.

The Ozark Zinc Oxide Company, of Joplin, has to obtain its supply of zinc from Mexico, receiving regular shipments from that country. They were forced out of this market nearly a year ago. The Mexican ore makes oxide all right, but it would not make spelter. The metal content in zinc ore is the smallest feature in its volatization into spelter. It must not contain other metals that are inseparable. Then, what is a western ore, with an assay of 25 to 35 per cent zinc, worth in comparison to ore free from objectionable associations and assaying 55 to 64 per cent zinc? Smelters know so much about the difference that the older heads in the business have forced up the price of Joplin ore to $50 per ton, rather than take what, if any, western ore they could secure.

Again summing up the situation, while I feel that present prices are higher than can be maintained for any length of time, yet the zinc ore of the Joplin district will not recede below a $40 basis very soon, unless there should come an entirely unlooked for business depression.

I believe the European demand has behind it an actual need, but I do not think smelters are now in a position to make concessions to secure orders for export, on which the profits go to the metal brokers.

SPELTER.

St. Louis, Oct. 6, 1904.

FERROUS SULPHIDE IN THE REVERBERATORY FURNACE.—In the manufacture of sulphuric acid, it is sometimes necessary to remove arsenical impurities by precipitation with sulphureted hydrogen. At the Freiberg Smelting Works the sulphide used in making sulphureted hydrogen has been obtained by partial reduction of pyrite, the operation being conducted in a shaft furnace. Owing to the formation of crusts, especially when the pyrite is mixed with more or less zinc blende, the working of the furnace is interrupted at frequent intervals, and the product is liable to show variation in quality. Experiments have recently been undertaken by C. A. Plattner (*Oesterreichische Zeitschrift fur Berg und Hüttenwesen*, September 24, 1904) for the purpose of determining whether the smelting could not be done to better advantage in a reverberatory furnace, and they have been so successful that this method will be exclusively adopted. The charge for a reverberatory is made up as follows: 100 parts pyrite (35 per cent sulphur), 25 parts silicious lead slag, and 25 parts limestone. The ferrous sulphide recovered contains about 34 per cent sulphur and 59 per cent iron.

Electric pumps at the Neu-Iserlohn colliery in Germany hoist 106 to 135 cu. ft. of water per minute from a depth of 1,300 feet.

ABSTRACTS OF OFFICIAL REPORTS.

Mount Morgan Gold Mining Company, Ltd.

This company owns and works the Mount Morgan mine, in Queensland, Australia, which is one of the great gold mines of the world. Its latest report covers the year ending May 31, 1904.

The financial statement for the year shows receipts as follows: Gold accounts, £467,428; copper, £15,485; interest, etc., £3,221; total, £486,134. Mine and reduction expenses were £318,797; leases, £730; railroad freight, £6,993; royalty, £5,274; total, £331,794, leaving a net balance of £154,340. To this is to be added £36,328 brought forward from previous year, making a total of £190,668. Payments for dividends were £150,000; dividend duty, £7,500; in all, £157,500, leaving a balance of £33,168 forward to current year.

The total work done in mining required the movement of 686,770 tons of material. The details of this work were as follows:

	Underground.	Open Cut.	Totals.
Oxidized ore	416	118,139	118,555
Sulphide ore	117,523	.....	117,523
Copper-gold ore	3,466	.....	3,466
Sulphur ore	1,147	.....	1,147
Limestone	153	.....	153
Total ore	122,705	118,139	240,844
Waste rock	16,702	123,599	140,301
Overburden	.....	305,625	305,625

Of the overburden, 219,105 tons were removed by steam shovel, and 86,520 tons by the old contract system. The ore sent to the works was 35.1 per cent of the total material handled, or 63.2 per cent of the rock mined.

Development included 1,058 ft. sinking and raising; 2,274 ft. driving; 10,135 ft. diamond drilling. The report of Mine Manager H. P. Seale says:

"The special features of the year's work have been the successful introduction of steam shoveling for excavating the large quantities of overburden that have to be removed in carrying out the present open-cutting scheme; the establishment of the milling system in mining the ore from the open cut; departures from the square-set system of timbering in the lower levels; and the installation of diamond drills for prospecting, with very satisfactory results. The steam shovel plant consists of one 65-ton Bucyrus shovel, two 10-ton locomotives and 20 side dumping cars of 4 cu. yd. capacity. A Whitaker shovel of 10-ton lift and another locomotive have been placed on order, and more cars are being made. The Bucyrus shovel has been working nine months, and its present daily capacity is approximately 1,500 tons. The Whitaker plant should be working in about four months' time. Three diamond drills are now working constantly and aggregate about 1,200 ft. of boring per month. The driving, sinking and rising done during the year have been mainly for oreways to supply immediate requirements in handling the ore, or to points from where diamond drilling may be conducted. Exploratory work has been carried on almost entirely by diamond drilling."

The development on the new copper-gold orebody shows approximately 534,200 tons of an average assay of 3.5 per cent copper and 0.4 oz. gold; 103,900 tons averaging 3 per cent copper and 0.125 oz. gold, and a large body—yet undetermined as to extent—averaging about 2.5 per cent copper and 0.075 oz. gold.

The rainfall for the year was 33.2 in. The new dam was filled for the first time, increasing the reservoir capacity very largely. The water consumption for the year was 206,433,108 gal. The water in the several reservoirs at the close of the year was 318,000,000 gal.

The ore treated in the reduction works was 118,906 tons sulphide, 118,555 tons oxidized and 30,794 tons tailing. The product was 122,252 oz. bullion, containing 109,903 oz. fine gold. The details of the production were as follows:

	Tons.	Gold, oz.	Value Per Ton.
Sulphide	118,906	59,146	$10.14
Oxidized	118,555	46,971	8.05
Tailing	30,794	3,786	2.50
Total	268,255	109,903	$8.34

Copper matte was also produced and shipped for realization. The quantity of matte was 157 tons, and the approximate contents were 75 tons copper and 1,794 oz. gold.

The report of H. S. Bohm, manager of the reduction works, shows that the cost of treating sulphide ore at the Mundic works was $3.20 per ton, or 44c. less than in 1903. The cost of treating oxidized ore at the West works was $2.44 per ton, a saving of 37c. as compared with the preceding year. The report says: "The copper canals on Mundic creek have been added to, and 188 tons of copper precipitates recovered, carrying about 77 per cent copper. In connection with these canals, a return water service has been installed, whereby all waste and spent liquors can be returned to the works and be re-used for various purposes, principally for sluicing out vats, thus obviating the necessity of drawing on the fresh water supply in the dams.

"The sluicing scheme mentioned in the last report is now well in hand, and half the Mundic works vats are now being emptied in this manner. This method has reduced the cost of emptying from 16c. to 12c. per ton, and within the next few months the whole of the vats on this plant will be similarly discharged. Arrangements are also being made for a like scheme for the West works. An improved plan for filling the vats at both works is being designed, and should effect a saving of at least 50 per cent in this direction. On the West works, owing to the increased percentage of mundic in what has hitherto been free oxidized ore, a more careful and thorough roast has been found necessary. To effect this the erection of a set of gas producers on this plant is proceeding, and, when completed, will materially increase the efficiency of the furnaces, and should at the same time decrease the cost of treatment. Owing to the installation not yet being complete, and also to the character and different kinds of coal supplied to these producers, it is not yet possible to make an accurate comparison between this and the use of wood as fuel. The erection of an earth embankment across the old wood flat is now in course of construction, which, when completed, will hold back the Mundic works tailing and enable the insoluble copper contained in it to be leached out with the aid of waste acid liquor from the works. The small amount of residual copper renders the use of strong solvents for this purpose too expensive, but the waste liquor is equally effective, though necessitating a longer time under treatment—hence the necessity for treating it in dams instead of vats, for which latter too great an outlay would be required. The West works tailing will be led through a race to the front side of the wall and there discharged. In this manner the leaching of the mundic tailing will not be interfered with."

The report of General Manager G. A. Richard says: "The prospecting of the auriferous copper ore discovered at the 750-ft. level has been pushed forward as quickly as time and position would admit, it being necessary to determine the extent and character of the ore before a decision could be arrived at with regard to its treatment. This body occurs as a continuation of the main orebody, and differs from the mundic ore higher up only in containing less gold and much more copper. The zone of payable ore is very irregular in shape, and is contained in an immense mass of apparently very similar material to that of the bodies of payable mundic ore now being mined. It is not separated from the worthless material by walls, as would be the case if it were an ordinary lode, and consequently there is nothing to indicate its continuation for any distance. These features rendered it necessary to keep close touch with the pay ore, and not go too far afield with deep bores. * * *

"The treatment of the auriferous copper ore has been the subject of close attention while developments have been in progress, but pending a full knowledge of its character and quality, only preliminaries could be arranged. The results so far may be summarized as follows: A large proportion of the ore is best treated by direct smelting in blast furnaces, but there is not sufficient pyrite in it to insure a minimum consumption of coke and flux, consequently it will not be smelted as cheaply as where what is called pyritic smelting is practiced. Although ore containing an excess of pyrite has been met with in parts of the mine—and is mined for its sulphur for sulphuric acid making—it has not yet been found in sufficient quantities to make it an important factor, though the proportion of pyrite has increased with depth. Sufficient is, however, known of the character and quantities of the ore to warrant the erection of a smelting and bessemerizing plant for treating the more suitable ores, and work in connection with the design and construction of this plant will commence early in July, and will be pushed on quickly to completion.

"The remainder of the ore is much too silicious to be smelted economically, and wet methods of extraction will need to be resorted to, unless ore containing an excess of pyrite is found in the meantime, in sufficient quantities. Results of this method of treatment in our present works have been eminently satisfactory on ores containing small quantities of copper, and bulk trials and experiments with higher grades have shown that, with some outlay for extra plant, equally good extraction can be expected with no very great increase in working cost.

"In both classes of ore much lower grades will have to be contended with sooner or later, and as advantage will have to be taken of every favorable condition, care, and, therefore, time, has been necessary."

Lehigh & Wilkes-Barre Coal Company.

This company operates the anthracite coal properties in Pennsylvania, which are controlled by the Central Railroad Company of New Jersey. The report covers the year ending June 30, 1904. As the previous report covered a period of 18 months, comparisons are not possible.

The capital stock is $9,212,500, of which the Central Railroad Company owns $8,282,800. The funded debt is $26,053,339. The company's debt to the Central Railroad Company is $1,744,614, having been reduced by $910,794 during the year.

The coal mined and shipped during the year was as follows, in long tons:

	By Co.	By tenants.	Totals.
Company's lands	2,771,258	1,158,683	3,929,941
Leased lands	876,496	157,178	1,033,674
Washeries	87,726	291,992	379,718
Totals	3,735,480	1,607,853	5,343,333

In addition to the coal mined, the company purchased 1,166,438 tons, chiefly from tenants, making a total of 4,901,918 tons. The tonnage sold was 4,776,951 tons, 124,967 tons being added to stocks. Of the coal sold, 65 per cent was of what are called the prepared sizes—chestnut and larger—and 35 per cent of the small, or steam sizes.

There was set aside out of income 10c. per ton mined from the company's lands. This is credited to the coal depletion fund, from which are drawn the sums required for the various mortgage sinking funds.

The earnings and expenses for the year are reported as follows, the averages being calculated on the tonnage given:

	Tons.	Amount.	Per ton.
Coal sales	4,776,951	$16,205,077	$3.39
Coal mined by tenants	1,607,853	497,821	0.31
Miscellaneous		23,098	.....
Total receipts	4,776,951	$16,725,996	$3.50
Mining coal	3,735,480	$6,683,531	$1.79
Royalties, leased lands	1,033,674	296,636	0.29
Coal purchased	1,166,438	2,869,954	2.46
Transportation and selling	4,776,951	4,421,004	0.93
General expenses	4,901,918	364,778	0.07
Depletion fund	3,929,941	254,585	0.06
Total expenses	4,901,918	$14,890,488	$3.04
Less coal stocked	124,967	367,835	2.94
Net expenses	4,776,951	$14,522,653	$3.04
Net earnings	4,776,951	$2,203,343	$0.46

Included in mining expenses are $923,376 for colliery improvements and repairs. General expenses include $273,756 for taxes and insurance. The net expenses were 86.8 per cent of the total receipts. Charges on net earnings were: Interest, $1,288,852; sinking funds, $138,409; bills payable paid, $142,269; total, $1,569,530; leaving a surplus of $633,813 for the year.

The report says, in part: "There has been no change in the funded debt. The collieries, equipment and other property have been maintained at their usual high standard. In order that the output may be fully maintained, and to provide for any increase in the demand for anthracite coal, as well as to replace collieries that are approaching a period of exhaustion, it has been decided to open up additional territory. The preliminary work of development is under way, and a reasonable proportion of the probable expenditures has been charged against the current year's business towards the cost of sinking shafts and constructing breakers."

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Dryers.—Can you name the best makers of dryers, like salt and ore, and what experiences can be cited to show their superiority?—E. A. C.

Answer.—You will find a list of representative manufacturers of mechanical dryers in the advertising columns of the Journal. All claim certain merits for their machines, based on the personal experiences of those whose demands have been met successfully. The efficiency of dryers is variable, depending on the materials treated. This is a topic for interest-

ing discussion, especially at this time when improvements are being made and new machines patented. In the salt industry both solar and artificial heat are used to evaporate the brines that constitute the chief source of salt used in this country. A good idea of the method employed in Kansas is given in an illustrated article in the JOURNAL for February 7, 1903, page 224. Here a series of huge pans, from 16 by 300 ft. to 16 by 1,300 ft. in ground dimension, and from 7 in. to 12 in. deep, are employed to evaporate the brine raised from wells at the rate of 600 gal. per minute by a centrifugal pump.

Sulphur.—In your issue of September 22 you speak favorably of the Louisiana sulphur competing with Sicilian. What is the current price of each grade, and how do they analyze? Is the Louisiana sulphur derived from dry beds or from springs, and what is the mode of occurrence of the Sicilian?—J. G. M.

Answer.—The sulphur beds in Calcasieu parish, Louisiana, closely resemble those of Sicily, which were minutely described in 'The Mineral Industry,' Volume VIII. Owing to the presence of wet and soft quicksand and gravel in the Louisiana mines, a unique method of working had to be adopted in order to extract the sulphur successfully and at a profit. A detailed description of this process, patented by Mr. Herman Frasch, will be published in the JOURNAL in the near future. The essential feature of the process is to sink a well as for petroleum, and by forcing hot water through iron pipes down to the bottom of the mine melt the sulphur in place. The pure liquid sulphur is then pumped to the surface and emptied into large reservoirs, where it congeals. In the course of extraction the sulphur is practically refined, and is marketed as 98 per cent seconds, and 99.5 per cent prime quality, the difference in price being 30c. per long ton. On October 4 seconds were quoted at $21.20 per long ton, f. o. b. New York, and prime or 99.5 per cent quality at $21.50. For shipment to Baltimore and Philadelphia 25c. extra is asked, and to Portland, Maine, 15c. per ton. Sicilian best unmixed seconds, constituting the bulk of the American imports and paying no duty, sell at $21.50 per ton at New York, while best thirds are worth from 50 to 75c. per ton less. The quality of seconds varies, and although originally analyzed from 98 to 99 per cent sulphur, is now said to carry less, owing to the practice of mixing thirds of less than 96 per cent purity with seconds. It is interesting to mention here that 'Louisiana seconds' are made by diluting the prime brand with enough inert material to make a product equal to Sicilian best unmixed seconds. Exports of Louisiana sulphur are being made to France, Germany and Great Britain.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

PROOF OF RECORD OF MINING CLAIM.—Where a State law or local law requires the certificate to be recorded with a county officer, whose duties are defined by statute—such as recorder, clerk, or register of deeds—the record will prove itself, and, as a rule, certified copies thereof are admissible in evidence with like effect as the original. But in case of records in the mining district, the rule is different. Such records do not prove themselves. They must be produced by the proper officer, whose official character must be shown, and the authenticity of such records must be established. Certified copies of such records cannot be admitted in evidence unless it be first shown that their custodian was empowered, under the local rules, to give and authenticate such copies.—Lindley's 'Law Relating to Mines and Mineral Lands'; Section 391, Second Edition.

PETROLEUM AND GAS ARE MINERALS AND ARE PART OF THE REALTY WHILE IN THE GROUND.—Petroleum and gas are minerals, and as long as they remain in the ground are a part of the realty, belonging to the owner of the land, and are a part of it so long as they are on or in it or subject to his control.—Lanyon Zinc Company v. Freeman (75 *Pacific Reporter*, 995); Supreme Court of Kansas.

PLACER CLAIMS MUST BE MARKED ON GROUND THOUGH SURVEYED.—Under the laws of the United States (Section 2324, page 1426) requiring that the location of mining claims must be distinctly marked on the ground, so that its boundaries can be readily traced, and Section 2329 (page 1432) directing that placer claims shall be subject to entry and patent under like conditions, but that where the lands have been previously surveyed by the United States the entry in its exterior limits shall conform to the legal subdivision of the public lands, an attempted location of a placer mining claim by posting a notice on a tree, claiming the exclusive right to prospect on a certain quarter section, without any effort to distinctly mark the location on the ground, is insufficient, and no rights are thereby acquired. A failure to complete the work is of no avail where work is resumed before re-location, and the fact that some of the co-owners abandon does not prevent the others from acquiring entire claim by compliance with statute.—Worthen v. Sidway (79 *Southwestern Reporter*, 778); Supreme Court of Arkansas.

DUTY ON FLASH-LIGHT POWDER—MAGNESIUM—MANGANESE.—Certain so-called flash-lights, classified as unenumerated manufactured articles under section 6, tariff act of 1897, were claimed to be free of duty under paragraphs 606 and 607, relating, respectively, to "magnesium, not made up into articles," and "manganese, oxide and ore of." Protests sustained.

The sample submitted at the time of the hearing consists of two powders packed in separate compartments of a tin box. The chemical expert, introduced as a witness by the importers, testified that one of these powders was the ordinary commercial magnesium, and the other the ordinary commercial manganese, kept separate by the partition in the box; that before the powder could be used as a flash-light the partition must be removed and the two powders mixed. There can be no question but that if the magnesium was imported in a package separate and apart from the manganese it would be entitled to free entry under paragraph 606, and the same is true of the manganese under paragraph 607. They could not then be said to constitute a non-enumerated manufactured article, nor are we able to see how they can be so classed when not mixed, though imported under the same outside cover. They do not become a mixture or a combination of any kind until after the partition which separates them is withdrawn and they are properly mixed.—Appeal of Farbenfabriken Company from Collector of Customs at New York; Board of General Appraisers.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending October 4, 1904.

771,220. APPARATUS FOR TREATING IRON.—James W. Arnold, Covington, Ky. In a heating-furnace, a charging-passage, a door normally closing said passage, and adapted to automatically open to deposit the metal delivered thereto upon the hearth, and to again close the passage; and a power-driven carrier adapted to carry and deliver the metal to the charging-door.]

771,241. PAINT COMPOSITION.—William A. Hall, Bellows Falls, Vt. A paint composition comprising about 200 parts of a powdered neutral mineral base, as talc or whiting, 5 parts of a vegetable oil, 50 parts of water, and about 100 parts of a binding composition comprising about 20 parts of an animal adhesive, and water, which animal adhesive will combine with the oil, water and base to prevent frothing and enable the paint to flow or spread readily.

771,271. CENTRIFUGAL PUMP.—Theodore Reuter, Winterthur, Switzerland, assignor to the firm of Gebruder Sulzer, Winterthur, Switzerland. In a centrifugal pump, a casing having an intake-chamber and a delivery-chamber, runners arranged within said casing between said chambers,and an outlet-valve communicating with the intake-chamber and operating to permit the escape of collected or accumulated air therefrom.

771,275. DEVICE FOR DRESSING STONE.—Friederick A. Schluns, Revere, Mass. In a stone-dressing machine, a cutter, means operatively connected thereto for reciprocating the same in a direction parallel to the face of the stone on which the cutter is operated, and means to prevent the cutting edge of the tool from springing away from the stone as it strikes the latter.

771,277.—PROCESS OF CONCENTRATING ORES.—Alice H. Schwarz, New York, N. Y., assignor to Schwarz Ore Treating Company. A method of concentrating ores, which consists in mixing a melted fatty matter which is solid at normal temperatures with the ore, then solidifying the fatty matter and separating the gangue from the values entrained in the fatty matter while the latter is solidified.

771,351. ELECTRICAL HOISTING APPARATUS.—Eugene B. Clark, 2d, Chicago, Ill., assignor to Otis-Elevator Company. A hoisting mechanism comprising the following elements: A hoisting-motor, controlling mechanism therefor, automatic mechanism for operating said controlling mechanism, manual mechanism for operating said controlling mechanism, and means for bringing into use either the manual or the automatic operating mechanism.

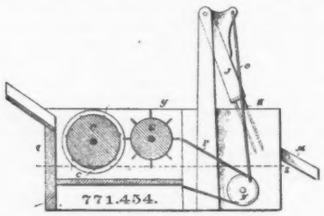
771,414. GAS-PURIFIER.—Rezeau B. Brown, Milwaukee, Wis. A gas-purifier having a vertically-disposed removable discharge-tube extending through the same, the lower end of which is closed by a removable cover.

771,438. CONVEYOR.—Thomas McDonald and Willis McKee, Youngstown, Ohio. In a conveyor, two movable frames, each frame having a set of supports for the material being conveyed, and means for effecting a curved movement of each frame for the purpose of giving a positive forward motion to the material being conveyed.

771,440. CLAM-SHELL HOISTING-BUCKET.—Alexander McKay and Michael Moss, Montreal, Canada; said Moss assignor to said McKay. In a clam-shell hoisting-bucket, a segment comprising a sheet of metal with end corner-slits, such segment having substantially right-angular flanges at the slits to which the edges of the end are riveted, and provided with a reinforcing end bar suitably secured to the top of the end.

771,454. APPARATUS FOR EXTRACTING GOLD FROM AURIFEROUS SAND, ETC.—Robert Blake, Madison, N. J., assignor to Eliza Blake, Madison, N. J. The combination with a tank adapted to contain a lower body of mercury and having a discharge located in a relatively elevated plane, of a horizontal cylinder

transversely within said tank and adapted to have its lower portion immersed in the mercury, provision for supplying material to the tank, in front of the cylinder, a pivotally-suspended arm depending within the upper portion of the tank at the rear of the horizontal cylinder and between the latter and the discharge, said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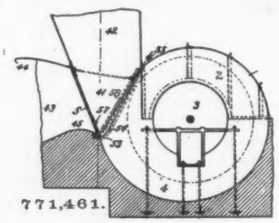
arm provided with a series of teeth extending transversely across the tank, the length of the arm and teeth conjointly being such that the teeth in their lowest position will be above the mercury, and means for actuating said cylinder for immersing the material in the mercury and causing said material to pass beneath the cylinder, and for oscillating the arm for causing the teeth to move back and forth in the path of an arc solely above the plane of the mercury surface.

771,461. VENTILATING-FAN STRUCTURE.—William Clifford, Jeannette, Pa. In a centrifugal-fan construction, the combination of a spiral delivery-chamber, a chimney-passage leading from the delivery-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chamber in an approximately tangential direction, a fresh-air passage leading laterally from the delivery-chamber recessed to receive and deflect a stream of air, and a flexible door conforming when in one operative position to the wall of the chimney-passage and when in another operative position to the wall of the fresh-air passage.

771,479. ARTIFICIAL STONE.—John W. Lewis, Bokoshe, Indian Territory. An artificial stone comprising the following ingredients in the proportions given: 35 lb. of portland cement, 43 lb. of common sand, 2 lb. of salt, 4 lb. of alum, 3 lb. of rice water, 5 lb. of plaster-of-paris, 2 lb. of Spanish whiting, 2 lb. of acacia, 2 lb. of linseed-oil, and 0.25 of a lb. of Prussian blue, compounded.

771,493. PLATE-CHARGING MECHANISM.—Peter C. Patterson, McKeesport, Pa., assignor to National Tube Company, New York. In furnace-charging mechanism, the combination of a supporting table or frame, tracks on each side thereof and a pushing-carriage traveling on said tracks and having a body portion extending transversely across and above the table and carrying a pusher.

771,557. APPARATUS FOR SCREENING LIQUID CLAY.—Fred M. Locke, Victor, N. Y. An apparatus for separating foreign matter from a liquid clay or kaolin solution, comprising an outer receptacle having an outlet, a stationary cylinder centrally arranged in said outer receptacle and having a solid top and bottom and foraminous walls, an inlet-pipe discharging into the cylinder through the top thereof to one side of the center of the cylinder, and rotary blades of flat rectangular form disposed vertically in the cylinder and extending from a point adjacent the top to a point in close proximity to the bottom, the outer edge of said blades being in close proximity throughout their length to the sides of the cylinder, and the said blades extending across the cylinder within and without the inlet-pipe.

771,559. STEEL ALLOY.—Charles E. Manby, Carnegie, Pa. Steel alloys containing nickel and ferro-vanadium, or ferromanganese.

771,566. METHOD OF MANUFACTURING HOLLOW BLOCKS OF ARTIFICIAL STONE. John O. Nye, Syracuse, N. Y. A method of manufacturing hollow artificial stone blocks consisting: first, in preparing a bed of sand or equivalent absorbent with one or more projections or cores; second, applying a paraffin surface to the upper surface of the bed; third, mixing the ingredients of artificial stone to a fluid condition, then pouring the same upon the paraffin surface.

771,611. SWAGING MILL.—Leonard D. Davis, Erie, Pa., assignor to National Tube Company, Pittsburg, Pa. In a swaging-mill, the combination of a rotative carriage, a swage mounted in said carrier so as to rotate relatively thereto and having movement bodily toward and from the axis of the carrier, and means for moving said swage bodily away from the axis of the carrier along the pass.

771,623. KILN.—David H. Gibson, Seattle, Wash. A kiln having a distributer disposed therein forming an annular space about the same and means for admitting air to said annular space through said distributer

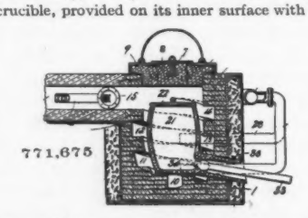
771,625. ROCK-DRILLING MACHINE.—Charles Gilliéron, Viège, Switzerland. An improved rock-drilling machine comprising the combination of a rotative shaft for carrying the drill; an independently-controlled advance screw; and a spring-controlled coupling device connected with the opposing extremities of said shaft and said advance screw, said coupling device transmitting to said shaft the longitudinal movements of said screw in both directions.

771,629. APPARATUS FOR CONDENSING NITRIC ACID.—Oscar Guttmann, London, England. In an acid-condenser, a connecting unit consisting of a chamber, inlet and outlet socket unions thereon and a comparatively small depending outlet for condensed acid adapted to be liquid-sealed by the condensed acid.

771,645. METHOD OF DECARBURIZING METALS OR ALLOYS.—Franz von Kügelgen and George O. Seward, Holcombs Rock, Va., assignors to The Willson Aluminum Company, New York, N. Y. A process of obtaining metals and alloys low in carbon, which consists in bringing a metal which contains an undesirable percentage of carbon in a molten state into contact with calcium and thereby decarburizing it.

771,646. PROCESS OF OBTAINING METALS.—Franz von Kügelgen, Holcombs Rock, Va., and Heinrich Danneel, Breslau, Germany, assignors to The Willson Aluminum Company, New York. A process which consists in electrolyzing a haloid of an alkali in the presence of an oxid of a metal, thus obtaining the metal, an oxid of the alkali, and the halogen, and maintaining a supply of the haloid and the oxide by adding fresh quantities thereof as they are decomposed.

771,675. CRUCIBLE-FURNACE AND CRUCIBLE.—Godfrey L. Smith, Newport News, Va. In a crucible-furnace, the combination of a crucible having a gravity discharge-spout, means for stoppering the same at its inner extremity, a body of resistant material inclosing the crucible, provided on its inner surface with a con-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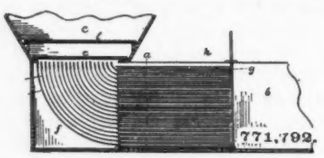
tinuous spiral passage and pierced by a series of burners disposed tangentially to the crucible distributed throughout the extent of the spiral and sealed into the body, an annular space between the crucible and the body and a removable cover in the top of the body located centrally of the crucible and smaller in diameter than the crucible, to permit access to the crucible without exposing the interior of the furnace to the air or the operator to the heat radiated by the walls of the furnace.

771,685. DUMPING-CAR.—Swan F. Swanson, Pueblo, Colo. A dumping-car body comprising side pieces, doors arranged in said side pieces, a center sill, transversely-arranged end bolsters secured to said center sill, downwardly and inwardly inclined end sections, a central transversely-disposed inverted V-shaped ridge-plate superposed upon the central sill and arranged between said end sections and extending upwardly above said central sill, swinging door-plates hinged to the lower edges of said ridge-plate to close against the lower edges of said end section, constituting continuations of the sides of the ridge-plate and forming with said side and end pieces and ridge-plate a body of approximately W form in longitudinal section, a crank-shaft extending transversely within the dome or housing formed by said ridge-plate and doors and journaled in the lower ends of said side pieces, crank-arms upon said shaft, links between said crank-arms and the door-plates, a crank-handle fixed to said crank-shaft, and means for locking said crank-handle in position for holding said door-plates closed.

771,706. PROCESS OF DESTRUCTIVE DISTILLATION OF RESINOUS WOOD.—Clarence E. Broughton, Savannah, Ga. A process for the destructive distillation of resinous wood, which consists in first treating the wood in a distilling-retort with superheated steam to drive off the easily-distilled light turpentine-oils without rendering them empyreumatic, then subjecting the wood to the combined action of steam and fire heat at a higher temperature above the boiling-point of turpentine to drive off the remainder of the turpentine and the light oils, separately collecting the turpentine and tar-oils thus driven off, then subjecting the wood to the action of fire heat alone at a higher temperature to drive off the creosote and heavy tar-oils, separately collecting the creosote and tar-oils thus driven off, and from time to time drawing off tar from the retort, whereby at the end of the treatment pure charcoal shall be left in the retort.

771,737. DRILL-SHARPENER.—Frederick Markwick, Scranton, Pa. A drill-forming die comprising a plurality of forming-bars, spacing-pieces interposed between said bars, a sleeve inclosing said bars and pieces, said sleeve being formed with a transverse slot, a collar surrounding said sleeve in the plane of said slot, and a wedge arranged within said slot between said collar and said bars.

771,792. HYDRAULIC FLUME FOR MINING FINE MATERIAL.—George W. Wilderman, Portland, Ore., assignor of one-half to Robert Alexander Thiebeau, Portland, Ore. A hydraulic fluming apparatus, comprising a hopper or receiver, means for screening and distributing the material discharged from the same, a flume or trough, a feeder in the trough under the hopper, said feeder comprising a series of curved, parallel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plates adapted to mechanically divide the pulp and solution discharging from the hopper into a plurality of thin streams, a tier of removable amalgamating-plates adapted to provide a plurality of parallel channels, so as to allow each of the streams of pulp and solution issuing from the feeder to pass between two plates of said tier; said plates being respectively plated with an amalgamating-film on both their top and bottom surfaces, and supported, one above the other, at such distance apart as to cause the top and bottom surfaces of each stream of pulp and solution to be in continuous contact with the surfaces of the two plates between which it passes; and means for holding the amalgamating-plates in place.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending September 17, 1904.

17,640 of 1903. ELECTROLYZING AMALGAM.—E. A. Ashcroft, Runcorn. Improvements in the process of electrolyzing an alkali amalgam so as to produce alkali metal.

17,895 of 1903. ZINC PIGMENT.—M. Malzac, Paris, France. Process for making a mixture of hydrated oxide and carbonate of zinc direct from ores for use as a pigment.

19,984 of 1903. MELTING FURNACE.—S. W. Price, London. Improved furnace for recovering precious metals from jewelers' sweepings, etc.

20,527 of 1903. ROCK DRILL BIT.—W. Shearer, Edinburgh. Improved method of removing and replacing bits in rock drills.

22,073 of 1903. ALUMINUM ALLOY.—F. W. Green and T. Prescott, Wakefield. Improved alloy for light articles composed of 70 to 90 parts of aluminum, 5 to 18 parts of magnesium and 2 to 12 parts of cadmium.

24,825 of 1903. TREATING ZINC-LEAD SULPHIDES.—A. H. Imbert, Paris, Producing lead or zinc from their sulphides by mixing with metallic copper, and afterwards recovering the metallic copper from the sulphide formed.

26,344 of 1903. CLINOSTAT.—W. R. Bawden, Kalgoorlie, Western Australia. Improved clinostat for recording the angle of deep bore holes.

SPECIAL CORRESPONDENCE

San Francisco. Oct. 5.

The mining industry of the Sierra Nevada region and northern California has been materially benefitted by a recent general and early storm, which broke the record of precipitation in this State for the entire month of September. At the latter end of the dry season many quartz mines yearly suspend operations, or operate on part time through the failure of water supplies, and placer mines usually are awaiting the swelling of streams and the filling of ditches by the fall and winter rains. In some years drought decreases the total gold output by a large percentage. The recent precipitation will hasten or increase productive operations in many districts, and with the normal fall rains an active and prosperous season will ensue.

A press report from the East states that 13 gold dredges are planned for the lower Yuba river bottom in Butte county within and above the area in which the government is expending $600,000 on débris restraining works. In this field a syndicate, in which eastern capital is largely interested, has already installed two of the largest dredges on the Pacific coast. The torrential Yuba drains the main hydraulic mining ground of Nevada county, and in its bed are concentrated the largest deposits of the mine tailings that were swept down the slope in former years, raising the river bed at one point about 80 ft. Long and careful prospecting of some miles of the stream bed preceded the two dredges mentioned, extensive areas have been acquired, and an expansion of the industry there is to be anticipated. Gold dredging projects are also under way on this stream, higher up the slope. It was on the lower Yuba that R. H. Postlethwaite, a few years ago, installed the first continuous bucket gold dredge in America.

All the 29 gold dredges of the Orrville field are operated by electric power at a cost of 1.5c. per kw. hour, which, under the conditions of operation, amounts to from $3 to $4 per h.p. per month, which is approximately one-third the estimated cost of steam power. These dredges are now using 4,300 horse power.

The dismissal of an injunction proceeding in the Alameda county superior court seems finally to clear the way for the construction of a highway from Livermore, Alameda county, southerly to the Santa Clara county line, an improvement understood to be preliminary to the extensive development of the magnesite deposits in the neighborhood of the boundary between these two bay counties. The county supervisors had contracted for the building of the road for $43,000, and technical legal actions in opposition were instituted. The mines have been acquired by the American Magnesite Co., as before reported, and the reported plans of the company include a large reduction and manufacturing plant at Oakland that will give employment to about 500 men.

The United States Circuit Court of Appeals has reversed the decree of the circuit court in the case of the Utah-Nevada Co. vs. J. R. de Lamar, in which the defendant was sued for $5,260,000, alleged to have been withheld by him. In 1894 a number of mining properties in Lincoln county, Nevada, and elsewhere, were acquired by Samuel T. Gobe. He transferred them to de Lamar, who was to receive 51 per cent of the stock and dividends, and who soon transferred them to the de Lamar Gold Mining Co., which he organized. It was alleged that the defendant made $11,000,000 in profits and sued for the amount stated. The decision remands the case to the State court, and so re-opens it.

The California output of portland cement, the recent rapid increase in which from the two new plants near San Francisco bay was noted in a previous letter, is to be further enlarged by the early resumption of manufacture at the old works at Colton, in southern California. This plant, which in recent years has produced 30,000 to 50,000 bbl. annually, has been closed for several months, during which time modern and more efficient machinery has been installed. The new equipment will result in a larger output and is expected to be ready for operation about November 1.

Denver. Oct. 8.

In the United States Circuit Court, Judge Marshall, of the District of Utah, on October 7, heard the injunction proceedings brought by the Interstate Mercantile Co. against the Mine Owners' Association and the Citizens' Alliance of Cripple Creek. It was decided that the injunction proceedings must continue on the original complaint, and the exceptions to the report of the master in chancery were not all allowed.

Application was made recently to the State Supreme Court, asking that the petition for a re-hearing in the Moyer habeas corpus case be dismissed. The court took the matter under advisement.

As the confession of Robert Romaine, referred to during the past few weeks, was evidently a fake, our officials have for the present decided not to prosecute him. He has been placed in the Kansas penitentiary, where he was sentenced for an indeterminate period for robbery committed at Topeka. Evidently his so-called "confession" was made only to evade punishment there.

Up to date nearly 5,500 recommendation cards have been issued by the Mine Owners' Association, and nearly 5,000 men are at present working in the district, which is said to be a larger number than was ever employed there before.

At Leadville the card system has been inaugurated without any trouble, and a gratifying condition exists in that camp.

The relative rights of the Colorado and the New York creditors to have possession of the assets of the General Metals Co. at Colorado Springs, representing an investment of about $400,000, are being contested in the United States Circuit Court.

The Portland mine will next week divide $180,000 among its stockholders, which will make the total of its dividends $5,377,000.

The statements appearing in the Denver press to the effect that Mr. Thos. F. Walsh's remaining interest in the Camp Bird mine had been purchased by the English company, and that the total price is $7,000,000, are both incorrect. The price arranged at the time of transfer, in 1902, was $5,300,000, of which $2,000,000 remains unpaid, being in the form of a royalty on ore mined from ground not included in the original estimate of assured reserves. While the matter of anticipating this royalty, which is at 20 per cent on the profit from ore situated as described, has been considered by both parties to the engagement, there is no immediate probability of a final settlement, both being satisfied with the present condition of affairs.

Idaho Springs made a good showing again last month, when 194 cars of ore were hauled down from that station, showing a large increase over the preceding month. The Chamberlain-Dillingham sampling works recently received 300 tons of ore in one day.

The Colorado & Northwestern railroad has finished the grading from Sunset to Eldora in Boulder county, and has begun laying track. The offer by this company to allow a rate of $1.50 per ton on ores not having a value exceeding $20 per ton, which will include the haul to the Denver smelters, is bound to stimulate shipments. This company owns a large low-grade property at Eldora.

The rail mill of the Colorado Fuel & Iron Co. is at present at work on a contract calling for 5,000 tons of 80-lb. rails for the Western Pacific railway, which is in course of construction.

A temporary injunction was granted by Judge Hallett in the United States court against the Aliunde Consolidated Mining Co. to prevent its interference with certain Clear Creek property.

At a special sitting of the United States Court of Appeals at St. Louis arguments were heard October 3 in the suit of Stratton's Independence company, against the estate of the late W. S. Stratton for $6,000,000.

A new corporation, called the Cripple Creek Central Railway Co., has been formed, which will take over all the property of the former Denver & South Western railroad, consisting of the Florence & Cripple Creek railroad, the Golden Circle railroad, the Canon City & Cripple Creek railroad, the Midland Terminal railway, and about 50 miles of spurs and branches, an aggregate of 130 miles. The new corporation is capitalized at $3,000,000, 4% non-cumulative preferred stock and $2,500,000 common stock. The officers are H. M. Blackmer, president; R. E. F. Flinch, vice-president, and John Gorlow, secretary and treasurer.

A good deal of interest is manifested in the coming annual meeting of the Colorado Fuel & Iron Co., to be held in this city on October 17, when the re-organization plans will be considered.

Houghton. Oct. 12.

The Isle Royale company has sunk a permanent shaft on the dip of the formation to a depth of 120 ft., near the center of Section 11, and nearly two miles south of any former developments on this particular lode. Drifting will be started this week with a view to thorough exploration. The present equipment is adequate for a considerably greater depth, so that sinking will probably be resumed after the drifting is under way. The showing in this shaft is excellent, and the outlook is considered locally as unusually promising; however, a retired mining captain, who was connected with the development of the Isle Royale's predecessor, states that these very rich spots are characteristic of the formation. At all events, the Isle Royale mine looks better to-day than at any previous time. The one hoisting shaft, No. 2, is running regularly and shipping approximately 500 tons of rock daily, with a fair yield of copper.

The Mohawk has bottomed its pit for the new No. 5 permanent shaft on the rock, after penetrating 18 ft. of overburden. The outcrop of the Kearsarge lode was uncovered in this pit, and the usual copper percentage was found, possibly a little better than the average. The shaft through the overburden is to be lined with concrete.

The Calumet & Hecla has penetrated the overburden and reached the rock at a depth of 43 ft. at No. 20 location. The Kearsarge lode had been explored at that point by means of 60 ft. of drifting at 100 ft. from surface. From that level a raise has been put up on the line of the permanent shaft to within six feet of the rock surface. This will be holed through as soon as the débris is removed from the bottom of the pit. No. 19 shaft has been encased solidly in concrete from the surface of the overburden to the rock, a depth of 47 ft. No. 20 will be similarly constructed. The hanging wall is made of three arches of brick, laid in four courses, where the strain is heavy, toward the rock surface, and three courses toward the collar, where the superimposed overburden is not so thick. These arches are supported by iron pillars, which serve as dividers between the compartments. There are two skipways, with a ladder-way between.

A. L. CARNAHAN.

Salt Lake City. Oct. 7.

The Utah-Apex Mining Co. is preparing to install a compressor plant at its Bingham mines. Work has begun on the 3,000-ft. drain tunnel, but it will not be pushed vigorously until the compressor is in operation. Walter C. Orem, of Salt Lake, is manager.

Connections having been made between the Daly-West and Quincy mines, at Park City, and operations through the shaft of the latter have ceased. Ore will be dropped from the Quincy workings to the 1,200-ft. level of the Daly-West. The Quincy, which is owned by the Daly-West company, will be operated hereafter at a monthly saving, it is said, of $5,000.

The survey of the line for the aerial tramway, which is to connect the Continental Alta mines at Alta with the new mill being built about four miles below, has been completed, and the construction of the towers upon which the rope is to be strung will begin within the next 10 days. The mill building is now under cover and machinery being installed. The plant will receive its power from a Pelton water wheel.

The directors of the Yampa Smelting Co., at a recent meeting, authorized General Manager Walter S. Kelley, of Salt Lake, to proceed with the enlargement of the Bingham smelter of that corporation, which will include reverberatory furnaces. An appropriation of $150,000 was made for this purpose. The ca-

pacity of the plant will be raised to 600 tons a day.

The Copper Belt railroad of Bingham, which has its tracks connected with the principal mines of that copper camp, moved 35,000 tons of ore during the month of September.

A financial statement issued from the offices of the Majestic Copper Co. shows that since August, 1902, there has been expended by that company, which owns property in Beaver county, for various purposes, the sum of $548,430. The outstanding indebtedness of the company, including all claims of every description, amounts, with interest to October 1, this year, to a trifle less than $300,000, which is held, to a large extent, by the trustees of the defense fund. The directors recently authorized the sale of $1,000,000 worth of gold bonds bearing interest at the rate of seven per cent. It is expected that by the placing of one-half the amount the present indebtedness can be met, and development at the mines carried on to the point that will justify the starting of the smelter again early next year.

At the annual meeting of the stockholders of the Horn Silver Mining Co. a board of directors was chosen for the ensuing year, which organized by the election of Allan C. Washington, New York, president; Juan M. Ceballos, New York, vice-president; Ambrose I. Harrison, New York, secretary and treasurer; Philo T. Farnsworth, Salt Lake, general manager. These, with William R. Britton and Theodore Moore, New York, and H. S. Young, of Salt Lake, constitute the board of directors.

Goldfield. Oct. 2.

Returns have been received from the last shipment from the Bowes-Kernick lease, on the Jumbo, as follows: 472 sacks (49,149 lb.), $33,722; eight sacks (a little less than half a ton), $4,766. Shipments are being made from the several leases on the property as rapidly as sacks and teams can be secured. Four carloads of sorted ore—approximately 60 tons—await shipment. The Vermylea lease, on the Jumbo, has been discontinued, as the operators had stoped all their ground above the lower level and decided not to sink for another lift, in view of the fact that the lease expired on October 31.

A strike of considerable importance has been made on the Brooklyn group, situated nearly six miles northeast of Goldfield. The property had heretofore been considered outside the mineral belt. In a prospecting trench, ore has been uncovered that assays from one to eight ounces in gold. The group had been purchased by Frank Ish and associates and will be thoroughly developed. The discovery is of especial importance, as by it the area of the district has been considerably extended.

Good reports continue to come in from Gold Crater, 28 miles east of Goldfield. On the Ridge & Curtis property eight feet of ore have been disclosed in an open cut. The group is being developed under the leasing system.

Initial shipments have been made during the past week from the Kendall and Quartzite mines.

High-grade shipping ore is being broken down and sacked from the 300 level of the Combination. This property has materially improved in the last ten days.

Butte. Oct. 5.

The hydraulic placer mining season is about ended; it has been very successful, especially in the western part of the State and in Missoula county. The amount of gold won from the gravels of Cedar and Hughes creeks exceeds that in any season for the past six years.

The Woods placer, on Hughes creek, a tributary to the Bitter Root river, has been opened up in a systematic manner, and the property is in good condition for the future. The last clean-up, representing two weeks' work, amounted to $17,000. A quantity of coarse tin-stone (cassiterite) was found in such proportions in the boxes as to interfere seriously with the clean-up. The California placer, 25 miles up Cedar creek, is closed for the year after a very good season. These diggings, as well as the Woods diggings, are owned in Missoula. The North Pacific Placer Mining Co., with headquarters in Butte, will open with a flume on bed-rock extensive placer diggings at the head of Fish creek. Material for the operations, including a saw-mill, will be placed on the ground this fall. The mining situation at Butte has not presented any extraordinary features, legally or politically, for some months. The usual amount of ore is going to the smelters. The Great Falls works of the Boston & Montana Co. seem to be gradually increasing the daily tonnage, which ranges around 3,400 at present. The statement comes from Great Falls that those works will, in the near future, do all the refining of the copper made by the Amalgamated company, this to include the production from the Washoe plant. It is understood to be the intention of the Boston & Montana Co. to purchase from James J. Hill and his associates the ground abutting on both sides of Rainbow Falls of the Missouri river. These falls are about two miles down the river from the present works at Black Eagle falls. A new refinery is contemplated for the new location, with the use of a good water power.

Toronto. Oct. 6.

Dr. J. M. Bell, who has been engaged during the summer in the exploration of the iron ranges of the Michipicoten mining division, in northwestern Ontario, reports to the Provincial Bureau of Mines that he discovered these ranges to be much more extensive than was previously supposed. He found several new areas, the principal of which were on the Pucaswa river and at Cameron lake, where there are fairly promising bodies of magnetite.

There is great activity and a very buoyant feeling at present in connection with the iron and steel manufacture, due to the energy with which railroad construction is being pushed and to the enforcement of the "dumping clause" of the tariff. In addition to the stringency with which it is being carried out as regards imports of machinery, rails, etc., a provision in the act affects contracts made by American firms for installing machinery, under which duty will have to be paid on the whole amount of the contract, including the price of the labor employed in Canada in installing the plant. The effect of this will be to turn over this part of the work to Canadian contractors.

Major John A. Currie, president of the Northern Iron & Steel Co., stated in reference to a report current in New York that the United States Steel Corp. had secured a controlling interest in the company, that such a statement was entirely premature. He admitted, however, that overtures had been made by an official of one of the large American steel companies, who, after examination of the plant at Collingwood, has begun negotiations looking to the acquisition of a controlling interest. Major Currie regards the position of the company in reference to the control of the Canadian market as having been thoroughly secured by recent Canadian legislation. It is understood that should the negotiations now pending result in the control passing into American hands, as appears altogether likely, Major Currie will retain his position, and that immediate steps will be taken to increase the plant by the erection of two blast furnaces, and possibly a rail plant. Dr. Stevenson, of Nashville, Tenn., was on Monday elected a member of the board of directors.

The Canadian Pacific railway has placed an order with the Consolidated Lake Superior Corp., of Sault Ste. Marie, for 40,000 tons of steel rails, to be delivered at the rate of 10,000 tons per month, beginning with February, 1905.

The Dominion Iron & Steel Co., of Sydney, Nova Scotia, has its new rod mill in active operation, turning out a high-grade quality of rods. The new washing plant is completed and in partial operation. Progress is being made in the construction of the rail mill, the foundation of which is completed and part of the machinery stripped. It is anticipated that it will be in working order early next year. The company has contracted with Pruck, Kretschel & Co., of Osnaburck, Ger., for the installation of a plant for the manufacture of pig iron from waste iron ore, the process for which was discovered a few years ago by Pruck, Kretschel & Co. The plant will cost about $8,000 and have a daily capacity of about 75 tons. It is claimed that the cost of producing pig iron under this process will amount only to 60 to 75c. per ton. This plant will be the first of its kind in use on the continent, and it is expected to effect considerable economy in steel production.

D. B. Dowling, of the Dominion Geological Survey, has returned to Ottawa from British Columbia, where he has been extending his explorations in the coal regions of Banff and Canmore. He states that in the Bow and Cascade valleys the Canadian Pacific railway has already opened up three coal mines. At Canmore they are taking out about 500 tons of steam coal daily. A new mine is being opened at Bankhead, the company having spent at this point about $500,000 in developing the mine and putting up a village for the accommodation of the miners.

H. C. Farnham, owner of an iron mine in Mill township, Hastings county, Ont., is negotiating with the Central Ontario railway for the construction of a spur line from that road to the mine, five miles distant. When this is secured active mining operations will be set on foot.

Victoria. Oct. 4.

The Coast.—It is reported that ore has been struck at a depth of 100 ft. on the Southern Cross mine at Alberni, while a new body of high grade ore has been developed at the Cascade.

Atlin.—Several new locations said to yield excellent prospects have been staked recently on Consolidated creek, emptying into Gladys lake. The original discoverers have already taken out good pay, and this news has created a stampede to the locality. The creek was staked in 1898, but no work was then begun.

Cariboo.—Another locality in which new gold discoveries are reported to have been made is immediately below the forks of the Horsely river. Here Mr. R. Campbell, a well-known operator, has located some ground which yielded $28 for a few hours' work. The discovery is not far distant from Empire creek, to which a resultless rush took place some two years ago. The Hull, a well-known claim on Grouse creek, was sold last week.

Lardeau.—The company owning the Lucky Boy group has been reorganized, and arrangements have been made for securing the necessary capital to continue the development of the property. The group is a promising one, and has been developed by levels and shaft to a depth of 170 ft. Three of the more recently exploited properties in the Lardeau, the Treadwell, Old Gold and Primrose groups are now beginning to make shipments of high grade ore. There is also at the Old Gold a considerable tonnage of zinc ore, which will be shipped as soon as road improvements have been made.

Slocan.—The Canadian government has distributed the final payment of 40 per cent of the lead bounty for the year ending June 30, 22 mines participating in the distribution. Water shortage has resulted in the temporary suspension of concentration operations at Sandon. The Reco is meanwhile working 35 men, the Slocan Star, 45; the Ivanhoe, 65; and the Last Chance, 16. The Jackson mill is being remodeled to treat zinc ores. In the Slocan City division a trial shipment of about two tons from the Blanfield, on Lemon creek, yielded $190 in gold and silver values.

Nelson.—The annual report of the Arlington mine states that to July 31, 1,068.5 tons were shipped, netting $47,360. Since that date the monthly shipments have amounted to about 90 tons of ore, which netted about $45 to the ton. The veins in the property are almost flat, forming distinct layers with the slate country rock. The width of the veins varies from 3 to 25 ft., with a like variation in size of pay streak. The ore is a lead-iron sulphide carrying gold. The gold values, which average two and a half ounces to the ton, are greater in those ores which carry most zinc (the zinc is not often sufficient to penalize the ores). There is a complete concentration plant on the Arlington, which, however, is not in operation.

Rossland.—The Velvet-Portland mine now has a 50-ton addition to the concentrator well under way. The plant is expected to be completed and running by the end of the year.

Much ore has been blocked out in the mine, and no further underground work is contemplated until the mill is finished. It is reported that new arrangements have been made for the treatment of the Spitzee ore, and that mining will shortly be resumed on an extensive scale.

Boundary.—The Providence Mining Co., which has just declared a sixth dividend of ten cents a share, has purchased the Diamond Fraction adjoining the property on the north. A company is being promoted to develop water power above Canon City, on the Kettle river. It is estimated that at low water 3,500 horsepower is here available. One furnace of the Montreal & Boston Co.'s smelter has been blown in, and the second furnace will shortly be in use.

East Kootenay.—Mr. S. S. Fowler, who recently returned from a visit to the Paradise mine, Windermere, states that on No. 4 level a lead of good concentrating ore has been struck which assures the future of the mine. The newly discovered ore is of a very high grade. The only problem now before the company is the treatment of its very large bodies of low-grade oxidized ore. It has already made extensive shipments of carbonates of lead and will continue to do so. The development work is already well forward and by next summer a concentrator will probably be in operation and a tram line connecting it with the mine.

Sudbury. Oct. 5.

Canada, like the United States, is now in the turmoil and excitement of an election. This is of especial interest to the Sudbury mining district for two important reasons. First, it is predicted that if there should be a change of government at Ottawa the nickel industry, which has been practically ignored by the late government, would be aided and put on a more patriotic basis by compelling the refining of the nickel in the country. The Dominion government has, if anything, been too liberal in bonusing the iron industry of Canada, but the struggling infant nickel industry of Northern Ontario has been very greatly retarded by the same government, which had the power to put on an export duty, but never did it. This has had the inevitable effect of all such permissive legislation. It has frightened capital away from our nickel mines. The second matter of unusual interest in the present contest is the building of the Grand Trunk Pacific railway, which is projected to run close to the magnetic iron range that has lately been discovered north of the nickel belt. The local prospectors are waiting impatiently for the line to be located through that section of the district, so that they may get in supplies more easily than by the few and difficult canoe routes up the rivers, with rapids and long portages in many places. In fact, there is no inducement to go exploring for iron mines in that region in the present condition of the iron market. Such remote and inaccessible properties have no selling value yet, and not a stroke of development work has been done on any of them this season, nor has a single sale been made.

Monterey. Oct. 5.

Some idea of the increase of Mexico's industrial production may be gained from the fact that the importations by way of Tampico during the first six months of this year amount to 90,000 tons of coke, as against 160,000 tons for 1903, and 52,000 tons of coal, against 40,000 for the whole of last year. This does not include the coal for the Mexican Central railroad, which keeps three steamers almost constantly busy, but is limited almost entirely to the demands of the mines and smelters, and more particularly to those of the American Smelting & Refining Co. and the Guggenheim interests. To this tonnage should be added the rapidly growing production of the Mexican coal fields and coke plants. As soon as the rains have ceased it is expected that this Mexican output will be added to by the development of the coal beds of Camocuautla, in the State of Puebla, by a Mexican company. The oil fields, particularly those of the Mexican Petroleum Co., of Ebano, San Luis Potosi, of which E. L. Doheny, of Los Angeles, is president, add materially to the fuel supply of the Republic. The Mexican Asphalt & Paving Co., an associate of the Mexico Petroleum Co., just mentioned, is shipping its asphalt to Guadalajara, New Orleans and New York.

In Guerrero, La Dicha Copper Co., controlled by George Mitchell and associates, expects to have its new smelting plant of 300 tons capacity running by the first of December. It consists of a 20-ton blast furnace and two 50-ton reverberatory copper smelting furnaces. This company has also obtained from the federal government a concession for the building of a railroad from Puerto Marques, about five miles from Acapulco, on the west coast, to the mines and smelter in the Bravos district, and on to Chilpancingo, the capital of the State. It is to be known as La Dicha & Pacific railroad, and will have about 75 miles of road, at an estimated cost of $2,000,000 gold. Already some 15 miles are graded, and it is expected to have the road finished during the coming year, when it is anticipated that the Interoceanic railroad will extend its line from Chianthis, Puebla, to Chilpancingo, and thus complete the transcontinental road. The company is also putting in a 500-h.p. boiler plant and two 65-h.p. and two 20-h.p. hoisting engines. All this will represent an outlay of over $2,500,000 gold. The work is under the management of E. D. Elson. It is said that the company has ore blocked out to the value of $35,000,000 gold, with 20,000 tons on the dump.

In Sonora, the Chicago Gold Placer Co. has two Risdon dredges, of 3,000 yd. daily capacity each, working in the Yaqui river near Susqui Grande, and the English, Alaska & Mexico Mining Co., a new company with $2,000,000 gold capital, expects to begin operations before the end of the year on 1,000 acres of placer ground owned by it near Buena Vista, on the Yaqui river. At El Tigre ground has been broken for the new mill, and it is expected to have it running by the first of the year. The Yaqui Copper Co., of Campo Santo Nino, which has been in considerable financial difficulty, has cut down expenses, started a campaign of economy and placed additional stock on the market. It is believed now that it will be able to continue the development work on its really promising property.

Perth. Aug. 29.

Kalgoorlie.—The government has, I think, acted wisely in refusing to extend the inquiry in the matter of the Boulder Deep Levels to the question of the over-estimation of ore reserves in the Boulder Perseverance mine, as it is asked for only in the interests of a small clique which lives on illicit information, and, of course, does not grumble when the information gives profits. The proposal to establish local boards of directors for all companies working West Australian mines is universally welcomed. It has worked well in South Africa, and would doubtless assist to create a local mining circle and market, and thus generally tend to increase interest and investment in West Australian mines.

W. R. Nichols is still in charge of the Perseverance, but expects to get away shortly. Mr. Pomeroy is ready to take it over from him on behalf of Bewick, Moreing & Co. The mine is looking better, and a new body of ore has been cut at the 200-ft. level, carrying good values. The Ivanhoe has also cut a new body of ore at the 1,200-ft. level. The formation is small, but of good value. This makes four distinct orebodies in this property.

Hannan's Proprietary Development Co. has been reconstructed and placed under the supervision of Bewick, Moreing & Co. At Lake View Consols, working costs for the past year were 27s. 7d. per ton, as compared with 32s. 7d. per ton for the year previous. South Kalgurli has been getting very high-grade ore from the 568-ft. level. The orebody is believed to be the same as that bored into at 1,500 ft. If this proves to be so, a fine shoot will be opened up, of phenomenal richness.

Development at North Kalgurli is going on well and with good results. The output of 1,500 tons per month should soon be doubled, when the present low rate of working costs—17s. 3d. per ton—will be further reduced. The Associated has again cut into the Brownhill lode in a cross-cut. The Boulder Deep Levels ore is being stoped over a width of 9 to 12 ft. at the 900-ft. level.

The North Coolgardie and Mount Margaret fields are making good progress. At Leonora, the Great Western Co. has crushed 400 tons for 465 oz. gold. The month's yield at Westralia Mount Morgans to August 11 was 3,718 oz. from 7,510 tons treated.

The Princess Alix crushed 400 tons for 1,600 oz. gold. The new finds at Erlistoun, north of Laverton, are opening up very well.

An association of leaseholders is being formed for mutual protection of interests and to watch all legislation, etc., in the interests of the leaseholders and prospectors.

The Queensland Menzies development and ore reserves have not been kept sufficiently ahead. Dr. R. L. Jack has so reported to the company and advises extensive development in the future. The Cumberland, at Norseman, has crushed 550 tons for 829 oz. The Great Fingall Consolidated's main shaft is now down to 1,209 ft.

July returns from the State-owned batteries show 5,567 tons crushed, yielding 5,872 oz. gold, at a cost of £4,989. Crushing charges amounted to £5,165, leaving a profit of £176.

Sydney. Sept. 13.

The bright feature of the industry in the eastern States is the sustained activity of the mines at Broken Hill. In submitting the half-yearly report of the Broken Hill Proprietary Co. the chairman supplemented the published figures by a statement showing that from the incorporation of the company in 1885 to the end of May, 1904, the ore treated amounted to some 7,116,000 tons, which yielded 662,303 tons of soft lead, 6,600 tons antimonial lead, 4,564 tons of copper, 3,524 tons silver, and 2.5 tons of gold; the wages paid amounted to not less than £7,000,000, and the expenditure on plant came to £1,309,000. In considering the returns from the mines on this field it is worthy of note that the average depth to which the lode has been worked is 850 ft., and bears very favorable comparison with the gold mines in the western State, which have been exploited to twice the depth in considerably less than half the time. The fact that the sulphides at the bottom levels show a higher percentage of metals than in the upper levels also affords grounds for considerable satisfaction.

The Broken Hill South Co. earned a profit of £41,345 during the half year, and the liquid assets amount to £61,475 in excess of liabilities. The ore won was 86,000 tons, the average assay value of same per ton being, lead, 16.11% silver, 9.11 oz., and zinc, 16.55%. Development work at the 600, 700 and 800-ft. levels has considerably augmented the ore reserves, and a conservative estimate of the ore available above the 800-ft. level is stated to be 1,250,000 tons.

Successful experiments extending over a considerable period have been made at the Broken Hill Central mine with the Cattermole process for separating the mineral contents from the gangue. This method, it is claimed, differs from other oil concentration processes in the fact that only a small quantity of oil is used, with the result that after agitation, the mineral matter with the oil adhering remains specifically heavier than the gangue, and the latter is accordingly carried off. The ore treated was ground down to pass a 50-mesh, and the minerals recovered ranged as high as 90%. The point now requiring to be determined is how best to separate so finely ground and slimed mineral as the zinc sulphide and the galena recovered by the process.

The advancement made by the Broken Hill companies in the way of recovering the zinc contents of the ores has given rise to the question as to what extent this is likely to affect the zinc market. It is true that for some time at least, and until larger plants are erected, the production will be limited to the export of concentrate assaying about 40% zinc, yet with the millions of tons of residue available for treatment by the recently established processes, it would seem quite possible, in the absence of some combination of interests by the several companies, to increase the output to such an extent as to seriously affect the market. A combination to control the export trade is accordingly mooted.

PERSONAL.

Mining and metallurgical engineers are invited to keep the ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Gardner F. Williams is at the Waldorf.

Mr. B. Magnus recently visited the Michigan copper country.

Mr. P. G. Lidner has returned to New York from South Carolina.

Mr. C. L. Wright sails by the *Cedric* for London on October 14.

Mr. W. E. Defty, of Phœnix, Ariz., is examining mines in Montana.

Mr. Pierre Humbert is re-opening the Cornucopia mine at Baker City, Oregon.

Mr. G. D. Doveton has returned to Denver from a professional trip to Mexico.

Mr. John B. Dougherty is on his way from Barranquilla, Colombia, to New York.

Mr. C. H. Nazro is superintendent of the Weyant Mining Co. at Pollock, Idaho.

Mr. Ernest G. Locke is in charge of Las Angustias gold mines, in Oaxaca, Mexico.

Mr. Edward Hooper arrived from London by the *Etruria*, on his way to Nelson, British Columbia.

Mr. Henry Wells, of Cripple Creek, who has been to New York on a visit, has returned to Colorado.

Mr. Robert Hay Anderson, of Mexico City, returned by the *Etruria* and is now on his way home.

Mr. G. M. Gouyard has returned to Denver from a professional trip to Idaho, Montana and Oregon.

Mr. William Frecheville has returned to London from inspecting mines at Kalgoorlie, West Australia.

Mr. R. Prewitt Coleman, of Denver, is with the Lindsay Cananea Center Mining Co., of Cananea, Mexico.

Mr. E. M. Rogers has gone to Colorado and Nevada, and expects to return to New York about November 1.

Mr. T. S. Dayton, manager of the Mexico Mine & Smelter Supply Co., of Mexico City, is now in this country.

Mr. Joseph Irving is in charge of a copper extraction plant in course of erection at Schull, county Cork, Ireland.

Mr. F. S. Swan, of the Allis-Chalmers Co., is in Mexico on business connected with contracts of the company.

Mr. H. C. Frick has been chosen a director of the Reading Railway Co., to succeed the late J. Lowber Welsh.

Mr. Ellis Mallery, of Los Angeles, Cal., is inspecting mining property in the vicinity of Yale, British Columbia.

Mr. Henry F. Davis, of Butte, Mont., has won the Marcus Daly scholarship at the Columbia School of Mines.

Mr. F. M. Downer has been appointed superintendent of the new United States coinage mint at Denver, Colorado.

Mr. R. O. Jones, chief engineer of the Jeanesville Iron Works Co., Hazleton, Pa., is visiting at San Francisco, California.

Mr. A. C. Brinker, having completed his professional work at Flat Iron, South Dakota, has now returned to Denver.

Mr. Arthur P. Hodgson has received the appointment of assayer at the United States coinage mint at Denver, Colorado.

Mr. H. Huntington Miller, of New York, is now at Parral, in Chihuahua, Mex., where he will remain for several weeks.

Mr. John G. Booker is now associated with the firm of Philbrick & Fenner, consulting mining engineers, of Goldfield, Nevada.

Mr. Henry Pels, representative in Germany of the firm of Henry Pels & Co., New York, is paying a short visit to this country.

Mr. Charles Baskerville, late of the University of North Carolina, is now professor of chemistry at the City College of New York.

Mr. Arthur H. Lawry, recently graduated from the Royal School of Mines, London, arrived by the *Carpathia* on his way to the West.

Mr. Geo. V. Michell is in charge of large placer mining operations at Campa Menta, Olancho, Honduras.

Mr. George B. Damon will have charge of the New York office recently opened by the Wellman-Seaver-Morgan Co., of Cleveland, Ohio.

Mr. J. A. McCaskell has been appointed general superintendent of the Daly-West Co.'s property in Utah, to succeed Mr. John H. Kirby, who has resigned.

Mr. John H. Kirby has resigned as general superintendent of the Daly-West Co.'s property in Utah. He will continue to serve as consulting engineer of the company.

Mr. George K. Fischer, of the United States Mining Co., will oversee the equipment of the Mammoth mine of the company in Shasta county, Cal., with smelting facilities.

Mr. George Warrington, founder of the Warrington Iron Works, of Chicago, is now superintendent of construction in the United States Light House Service at Washington.

Mr. William J. Herdman, of the University of Michigan, is investigating the presence of pitchblende or other radio-active substances in the mines of Cripple Creek, Colorado.

Mr. Victor Walteyne, engineer-in-chief of mines and director of the ministry of public works of Belgium, is visiting the mining regions of the State of Chihuahua, Mexico.

Mr. Fred Lyon, civil and mechanical engineer for the United States Mining Co., will be at the Mammoth mine of the company in Shasta county, Cal., for an indefinite period.

Mr. Charles Gunn, of the Union Iron Works, of San Francisco, is now visiting in the East. On his return he will take charge at the Columbian Engineering Works, at Portland, Oregon.

Mr. John J. Case, former superintendent of the Tamarack-Osceola smelting plant, at Dollar Bay, Mich., is now in charge of the new copper smelter being erected at Sault Ste. Marie.

Mr. Lindsay Duncan has resigned as professor of civil engineering in the University of Colorado, at Boulder, Colo., to engage in engineering work, with offices at Denver, Colorado.

Mr. Robert Grant, formerly general manager of the Parrot company, has returned to Salt Lake City after spending two weeks at Butte and Anaconda examining mining and smelting properties.

Mr. J. J. Rutledge, who has been connected with coal mining work in Illinois and other States, has opened an office as consulting engineer in Baltimore, his specialties being coal, iron ore and pyrite.

Mr. George S. Binckley, of San Francisco, has returned home after spending about a year in the installation of the electric power plant of the Puget Sound Power Co., on the Puyallup river, Washington.

Sir James Kitson, of the Iron & Steel Institute, who will make the speech presenting Mr. Andrew Carnegie with the Institute's medal of honor, October 24, will sail from Liverpool October 14, on the *Celtic*.

Mr. F. C. Greene, consulting engineer for the Allegheny Coal Co., Jefferson Coal Co., Morris Poston Coal Co., Youghiogheny & Ohio Coal Co. and Beaver Dam Coal Co., has opened offices in the Citizens' Building, Cleveland, Ohio.

Mr. George A. Laird, formerly superintendent of the Victoria mines, Cerro San de Pedro, San Luis Potosi, Mex., has been appointed superintendent of the Sierra de Cobre mines of the Phelps-Dodge Co., at Cananea, Sonora, Mexico.

Among those who will come from England to attend the meeting here of the British Iron and Steel Institute are Professor H. Bauerman, Messrs. Bennet H. Brough, R. A. Hadfield, Herbert Hughes, D. A. Louis and H. Kilburn Scott.

Messrs. Tsunema Kuroda, Kilchiro Takagi and Y. Saiki, representing the Mitsui Mining Co., of Tokio, Japan, who are making a tour of the United States, England and Germany for the purpose of studying mining and shipping methods, are now in this country.

OBITUARY.

Herbert Cassard, of Baltimore, president of the Security Mining & Trust Co., of New York, died of heart disease October 3 in New York city.

John Serena, president of the Serena Coal Co., of McKeesport, Pa., and one of the oldest coal operators in the Monongahela valley, died at McKeesport October 7, aged 75 years.

Charles B. Squier died October 6 at Rahway, N. J., aged 54 years. He was formerly a member of the zinc firm of Manning & Squier, of New York. When the amalgamation of the zinc companies took place some years ago, Mr. Squier became treasurer of the New Jersey Zinc Co. He retained this position until two years ago, when he retired on account of ill health.

Edward Doerr died in the hospital at San Antonio, Tex., on October 4. He had recently been examining a mine for the Peñoles Mining Co., at Mapimi, in Durango, Mex., being at that time manager of the Vascas-San Marcos mine, near Nombre de Dios, also in Durango. He had previously acted as representative for the Guggenheim interests at Mexico City. At Mapimi he got wet while underground and contracted pneumonia; that his illness was fatal became manifest while he was on the train en route to Iowa, to see his children, who lost their mother last January. Mr. Doerr was a little over 40 years of age and had won a high reputation for ability and energy.

John Carpenter Angell, a pioneer of California, died October 5 at Poughkeepsie, N. Y., aged 86 years. In company with Mark Hopkins, Dr. J. B. Stillman, J. Ross Brown and others, he sailed in 1849 for San Francisco. He was successful in the diggings, and was also for a time connected with the San Francisco Custom House. After returning to New York he was president of the Bell & Heath Coal Mining Co. He was a large stockholder and a trustee of the Clifton Iron Works and the Clifton Steel Works, but the financial crisis of 1873 caused him to suffer serious reverses, and he once more returned to the Pacific Coast and remained 15 years. Afterward he returned to New York city.

SOCIETIES AND TECHNICAL SCHOOLS.

Iowa State University.—A model concentrating plant mill is to be purchased for the department of mining engineering at this institution. It will be furnished by the American Concentrator Company.

Montana Society of Engineers.—The regular meeting of this society was held on October 8. The subject for consideration was 'Mining Laws of the United States.'

Colorado College.—From this institution at Colorado Springs, Colo., we have received a handsome book of views, which includes several pictures of the buildings and rooms of the engineering department.

Franklin Institute.—A meeting of the sections was held on October 13. The program included a discussion of the contact process for sulphuric acid, by Mr. Waldemar Lee, and industrial notes, by Dr. Bruno Terne.

Pratt Institute.—This institution at Brooklyn, N. Y., has opened to the public an applied science reference room, devoted to technical and trade literature. It is desired to make this department as useful as possible to the practical men engaged in the various trades and industries. The room contains books, bound periodicals, and current periodicals, and is in charge of Mr. Herbert L. Cowing, a graduate of the Mechanical Engineering course of Cornell University. The room is open every day from 2 till 6, and on Monday, Wednesday and Saturday evenings until 9:30. It is desired to form a collection of trade catalogues and bulletins bearing upon all branches of industry. These catalogues will be accessible to the public, and the Institute would be glad to receive them from any of the advertisers in, or readers of, this JOURNAL.

TRADE CATALOGUES.

Bulletin No. 1 of the Rotary Engine Co., of Philadelphia, is devoted to a description of the Warren rotary engine.

The Abner Doble Co., of San Francisco, has issued an uncommonly attractive little book descriptive of its tangential water-wheels.

A descriptive catalogue of Wood's propeller pump has been issued by P. K. Wood, of Los Angeles, Cal. It contains illustrations of these pumps and their parts.

The C. W. Hunt Co., of West New Brighton, N. Y., in catalogue 046, describes in detail its electric hoists, winches and capstans for direct or alternating currents.

One of the daintiest booklets that has come to us recently is issued by the Jeffrey Manufacturing Co., of Columbus, Ohio, and describes the Jeffrey grab buckets.

The last issue of the *Cement Age*, a monthly periodical for users of cement, gives most of its space to a description of the concrete work in the New York Rapid Transit subway.

The Wellman-Seaver-Morgan Co., of Cleveland, Ohio, devotes a handsome catalogue to a description of the Foster water-sealed reversing valves, of which it is the manufacturer and selling agent.

C. C. Lane, of Los Angeles, Cal., has prepared a little book about the Lane roller quartz mill. It contains a full description of the mill and many cordial indorsements from those who have used it.

A new type of shot-gun ammunition—short range loaded shells, designed especially for brush and field shooting on short range—is described in a circular sent out by the Union Metallic Cartridge Co., of Bridgeport, Conn.

The Raymond Brothers Impact Pulverizer Co., of Chicago, in catalogue No. 7, describes in detail the Raymond system of air separation, the Albert Raymond roller mill, pulverizers and other machinery of which it is the maker.

The Lucal Light & Heating Co., Ltd., of Glasgow, Scotland, has published a report of the test of its liquid fuel burner by Prof. Watkinson of the Glasgow Technical College. The report is highly favorable to the merits and advantages of these burners.

The Watt Mining Car Wheel Co., of Barnesville, Ohio, has sent out an exceptionally artistic catalogue of its products, which include mine cars complete, mine car irons, steel mine cars, ore cars, mine car wheels, mine car axles, Watt patent self-oiling mine car wheels, and Watt patent channel bar attachment for round axles.

INDUSTRIAL.

The Pocahontas Collieries Co. announces the removal of its offices from Arcade Building, Philadelphia, to 30 Pine street, New York.

The Colorado Iron Works Co., of Denver, Colo., has received a contract for the concentrating machinery to be installed at the Poland Extension mine, in Arizona.

The American-Mexico Mining & Development Co., of Chicago, has placed a contract with the Allis-Chalmers Co., of New York, for a 100-ton lead smelter for installation on its Mexican property.

The Washington State Analytical Laboratory has taken offices in the Colman block, at Seattle, Wash. It will do assay and analytical work. Mr. Paul Flury, of El Paso, Texas, who has had considerable experience as an employee of one of the big smelters, is the manager.

The Burt Manufacturing Co., of Akron, Ohio, which makes the well-known Cross oil filters, has recently made a shipment of five oil filters to its agency at Helsingfors, Finland; also three large shipments to its representative in Havana, Cuba, and four filters to customers at Valparaiso, Chile.

The Wellman-Seaver-Morgan Co., engineers and manufacturers, with general offices at Cleveland, Ohio, and plants at Cleveland and Akron, Ohio, announce the opening on October 1 of a New York office at 42 Broadway. Mr. George B. Damon has been appointed New York manager, and any inquiries addressed to the New York office will have his immediate and personal attention.

The new Susquehanna plant of blast furnaces, at South Buffalo, has been started and made its first cast of pig iron September 29. This pair of furnaces represents the most advanced step in modern blast furnace construction, and is being watched with interest by the iron trade. Each of the two furnaces has a daily capacity of 400 tons of pig iron. Mr. Wm. A. Rogers is president of the iron company, whose product will be handled by Rogers, Brown & Co.

The Power & Mining Machinery Co. has been awarded a contract by the Western Gas & Fuel Co. for one two-cylinder American-Crossley gas-enegine, 28 by 36 in., single acting, speed 130 r.p.m.; normal brake h.p., 510; maximum, 570; direct connected to two Ingersoll-Sergeant 14¼ by 36 in. single-acting compressors; cylinders located in tandem to the gas cylinders. This plant is to be used for compressing gas entering the cylinders at an initial pressure of 50 lb., and discharging at 350 lb.

C. H. Bradley, Jr. & Co., of Pittsburg, have on exhibition in the machinery building at the St. Louis World's Fair a triple expansion engine in which the steam ports and valves between the three tandem cylinders are in the common piston rod. There are two sets of cylinders, the cranks on the common shaft being set at right angles. The engine on exhibition is used in the exposition arc-lighting service and has the distinction of being built in accordance with the metric system throughout. The condensing apparatus consists of a 2,000 sq. ft. Worthington condenser, a Blake vertical, twin beam air pump, and an 8-in. Worthington volute circulating pump. The vertical twin air pump was originally developed by the George F. Blake Manufacturing Co. for marine service. There are two air cylinders placed vertically side by side, with the steam cylinders directly above, the two piston rods being connected by a walking beam. A crank on the shaft of the walking beam works the slide valve of a small cylinder, the piston of which is in reality the driving engine of the main steam cylinder valves, this mechanism giving complete control of the main pistons. The pump is intended to handle both air and the water of condensation.

The Allis-Chalmers Co. announces the following changes and appointments of salesmen: Charles S. Buell, who until recently represented the Westinghouse Machine Co. in Chicago, as salesman and engineer in the power department; John F. Burke, for a number of years with the Westinghouse Electric & Manufacturing Co., in Omaha, Neb., will sell Corliss engines, electrical apparatus, and crushing and cement machinery at Omaha; Wilbur M. Ruth, until recently assistant to the president of the Mesta Machine Co., Pittsburg, Pa., will be salesman and engineer for the Allis-Chalmers Co. at Pittsburg; M. C. Miller, recently with the alternating current department of the Westinghouse Electric & Manufacturing Co., Pittsburg, Pa., accepts a similar position with the Allis-Chalmers Co.'s electrical department; Charles F. Adae, lately manager of the Pittsburg office of the C. Lee Cook Co., has been appointed to the selling force of the Allis-Chalmers Co. at New York; S. H. Sharpsteen, for several years salesman at the New York office of the General Electric Co., will hold a similar position with the Allis-Chalmers Co. at New York; G. Fred Collins, special representative at the New York office; W. M. S. Miller, until lately in the detail and supply department of the Westinghouse Electric & Manufacturing Co., has joined the staff of the Allis-Chalmers Co., with headquarters in Chicago; R. L. Richardson, lately with the Westinghouse Electric & Manufacturing Co., is now a member of the Pittsburg selling force of the Allis-Chalmers Co.; John V. Redfield, of the Chicago sales office of the Westinghouse Electric & Manufacturing Co., has been appointed to the sales staff of the Allis-Chalmers-Bullock interests at the Chicago office; James Ashworth, recently in the employ of the city of Chicago, becomes salesman in the pumping engine department of the company; Otto Clyde Ross, lately in the employ of the Hartford Lead, Zinc, Mining and Smelting Co., has accepted an appointment as engineer and salesman.

GENERAL MINING NEWS.

Chesapeake & Ohio Railway Co.—Coal and coke shipments in August were, in short tons:

	Coal.	Coke.
New River	493,340	14,837
Kanawha	165,623	2,273
Kentucky	8,386	.....
	667,349	17,110
From connections	12,492	363
Total	679,841	17,473
July shipments	600,911	15,118
Two months	1,280,752	32,591
Total, 1903	848,327	66,037
Changes, 1904	I. 432,425	D. 33,446

Shipments this year were principally to tidewater.

ARIZONA.

GILA COUNTY.

Arizona-Colorado.—Work has been resumed on this property, at Globe.

Old Dominion.—Work on the smelting plant at this mine, at Globe, is being pushed as rapidly as possible.

GRAHAM COUNTY.

Shannon Copper Co.—This company's plant, at Clifton, is said to be making 1,000,000 lb. of copper monthly. The ore averages about 5 per cent copper.

MARICOPA COUNTY.

Minnesota—Connor.—These properties, at Kingman, have been sold to F. H. Griffith and others by the Philadelphia & Arizona Mining Co. Extensive development work will be begun at once.

Palace Gold & Copper Co.—At this company's mine, at Phoenix, a tunnel is being run under the apex on the Carbonate Queen claim.

PIMA COUNTY.

Silver Bell.—Active operations are being carried on at several properties in this district. Among these are the Indiana-Arizona, the Red Bank, the Old Boot and the Young America.

PINAL COUNTY.

Ray.—It is reported that operations will be resumed at once on this property, at Kelvin. An 800-ft. shaft will be sunk in the old workings.

Troy-Manhattan.—A large body of wulfenite is reported uncovered on this property, at Troy. A concentration mill to treat the product is being constructed.

YAVAPAI COUNTY.

Midnight Test.—A good body of ore is reported at this mine, near Prescott.

CALIFORNIA.

AMADOR COUNTY.

Burlington.—The shaft at this mine will be sunk to 300 ft., when a cross-cut will be run to the ledge, which is about 100 ft. wide above. A hoisting and drilling plant is to be installed by Manager Lutellus Smith.

Wildman.—A drift is to be run to the lower workings of this mine from the adjacent Lincoln, the unwatering of which for the purpose is practically completed. John Ross is superintendent.

CALAVERAS COUNTY.

Othello.—Some rich ore has been encountered in this mine, near Murphy's. It is being developed by John M. Shepherd and others.

San Andreas Blue Gravel Mining Co.—J. A. Stewart, H. W. Miller and others, of San Andreas, have incorporated this company and will develop a property within the town limits, which comprises a large section of a lava-capped ancient channel, in which mines are successfully operated above and below this point. Water has blocked former efforts to sink to bed-rock, which will now be reached with the aid of adequate pumps.

Sheep Ranch.—Several men have recently been discharged from this mine for stealing rich ores.

EL DORADO COUNTY.

August Cook.—A hoist and mill for this mine, near Diamond, has been contracted for by J. F. Burslam, of Long Beach, Cal., who recently acquired the property and is rapidly developing it.

Rupley.—This gravel mine, formerly known as the Sugar Pine, is to be developed by Theodore Rupley, of Placerville, and W. J. Berry, of Selma.

FRESNO COUNTY.

Jessie Bell.—At this foothill copper mine ore is being taken out, and two carloads are ready for shipment. A gold-bearing vein is also being worked, and a Huntington mill has been installed.

KERN COUNTY.

Summit.—A number of placer claims in these diggings, about eight miles from Johannesburg, have been secured by Charles Teagle, who proposes to work them with the aid of a gravel concentrating plant.

MONO COUNTY.

Masonic Mountain.—Several properties are being worked and developed in this district, on the eastern side of the Sierras. An incline is being sunk in high grade ore in the Pittsburg, a shaft has been started in the Myrtle, and Julia, operations have been resumed at the Blue Gold, the Hermence is being developed, and tunnel driving will continue all winter on the True Friend group of claims.

NEVADA COUNTY.

Culbertson.—At this mine, in the Graniteville district, work has been temporarily suspended, pending the installation of heavier hoisting machinery, with which the shaft will be continued deeper.

Mountaineer.—Hoisting has been resumed at this mine since the water has been turned into the new pipe line, 4,800 ft. long, bearing a 780-ft. pressure.

Orleans.—High-grade ore has been developed in this mine, and a six days' run of the mill has yielded $3,200, from ore averaging $75 per ton. Superintendent Charles Brockington persisted in the development of this mine for five years under the difficulty of lack of capital. The miners have been mainly paid in stock, some so working for five years, and 32,000 out of 40,000 treasury shares have been so paid out.

PLUMAS COUNTY.

Messer.—This hydraulic mine, on Spanish creek, is to be operated again this season by E. J. Gordon and P. McElroy should the California Debris Commission grant the permit applied for.

Oakland.—George E. Hogg will let a contract for driving a tunnel at this mine this winter, and will put in a mill next spring. The property is 18 miles northeast of Downieville.

SAN BERNARDINO COUNTY.

Out West Mining Co.—George E. Bailey, A. E. Moon and others, of San Francisco, have incorporated this company to develop a quartz property on the Mohave desert.

SAN DIEGO COUNTY.

Stonewall.—Manager Clark reports rapid progress in unwatering this old mine, at Cuyamaca, which yielded several millions in past years. The work of retimbering the old shaft has begun, and when the water is removed explorations will go forward on the fourth level. As power is required for pumping, the 20-stamp mill is kept running on ore from the dump, which averages about $3.50 per ton, and of which there is several thousand tons.

SHASTA COUNTY.

Basler.—The Basler Mining & Development Co. has located a tunnel claim on which it is proposed to run a tunnel 3,000 ft. to develop claims in the western part of the county belonging to the company.

SISKIYOU COUNTY.

Classic Hill.—This hydraulic property, belonging to the Ricoro Gold Mining Co., T. S. Fuller, president and superintendent, and located near the State boundary, will be operated with two giants this season. It has been developed during the summer and a flume and saw-mill have been built.

Cuban Beauty No. 2.—The State Supreme Court has given judgment in favor of W. F. Dyer and others in a suit involving a portion of this property, through the overlapping of claims, brought by G. W. Divinelle. The mine is in the Gazelle district.

Morrison.—The Morrison-Garlock Gold Mining Co. has added 10 stamps to the mill at this mine, near Fort Jones, and is sinking the shaft, now 350 ft. deep, and developinb a large ore supply.

Minetta B.—This property includes a large area of hydraulic mining ground on the Klamath river, on which the Railroad Mining & Milling Co., of Denver, has been engaged since July in extensive preparations for operating during the ensuing season. T. J. Nolton is superintendent.

Pacific Mining Co.—This company has completed a flume, which will provide a large water supply for this season's operations at this mine, near Happy Camp. J. W. Martin is superintendent.

TRINITY COUNTY.

Haas.—This mine, near Junction City, has been sold to J. Elliott.

Unity.—W. M. Stover has bought this property, near Minersville.

COLORADO

BOULDER COUNTY.

(From Our Special Correspondent.)

Coney Island.—Sylvanite ore is reported to have been opened up in this group near Eldora. C. O. Nelson, Eldora, Colo., is manager.

F. J. K.—This group of claims on Woodland mountain has been sold to Massachusetts and Pennsylvania parties, who have incorporated as the Woodland Mining Co. The property will be opened by tunnel workings under management of J. R. Campbell, Eldora, Colo.

Nederland.—Good finds of tungsten ores are reported in this vicinity, and a good deal of attention has been given to this district during the summer and fall. Experts have been sent in to look at the various showings, and the Krupps of Germany have had one of their representatives in the district for some time. A mill which is running on tungsten ores has been overhauled and remodeled at Nederland, the concentrate being shipped to Boulder for reshipment. Eastern parties, who are heavily interested in the Boulder County mine, have begun installation of machinery and buildings on its tungsten group, management of which is in charge of F. W. Lake, Nederland, Colo. Three cars of tungsten ores have been shipped over the Moffat road to Denver, and it is reported that some of the ore carried values as high as 50 per cent in tungsten.

CLEAR CREEK COUNTY.

(From Our Special Correspondent.)

Bertha.—Manager McClanahan, of Booneville, Mo., is having an addition built to the mill for the purpose of doubling the capacity, bringing it up to 100 tons daily. The improvements consist in adding two Kinkead mills, two batteries of rapid drop stamps, with Gilpin County bumping tables and Wilfley tables.

Dives-Pelican and Seven-Thirty.—Arrangements are being made for the installation of a larger air compressor plant at the Burleigh tunnel near Silver Plume. Kentucky capital is largely interested, and J. H. Eaton, Silver Plume, is manager. It is also reported that the company will soon let a contract for the erection of a mill to handle the large quantities of low-grade ore in the old workings as well as in the large dumps.

Harris.—A recent shipment from this property in Argentine district is said to have given values of 1.130 oz. silver, the second grade running 146 oz. per ton.

Lamartine.—Arrangements are being made for the installation of electricity for the operation of this entire property near Freeland. John Lang, Idaho Springs, is manager.

Liberty Bell.—It is reported that this group, two miles from Silver Plume, has been sold for $15,000, and that a company is being formed for development. Ben J. Martelon, Idaho Springs, is manager of the new company.

Sun & Moon.—Sinking operations are progressing favorably with drills, and the product of this property is ranging from 50 to 60 tons per day, both mill and smelting ores being of a uniform grade.

Transcontinental Mining, Milling & Tunnel Co.—R. C. Vidler, manager at Georgetown, Colo., has made arrangements, it is reported, for the transfer of one-half of the holdings to an English syndicate for a consideration of $1,000,000. The Vidler tunnel has been driven over 600 ft., and will cut a great many lodes with added depths. It is considered one of the largest mining propositions in the northern end of the county.

GILPIN COUNTY.

(From Our Special Correspondent.)

Justice.—This property in Lower Russell district has been leased and bonded to Denver and Eastern parties, and taken under the management of J. F. Stanish, of Central City, Colo. The main workings are down over 600 ft. and sinking will soon begin. The property has been a consistent producer.

Kokomo-Dumont Mining & Milling Co.—This company is operating the Kokomo mine in Russell district, and, besides, owns mining property and a mill near Dumont, in Clear Creek county. Regular shipments are being made via the Colorado & Southern road to the Dumont mill, and the concentrating ores are reported to give very good values. A carload shipment of smelting ores gave net returns of $36.84 per ton. The company is contemplating treating its tailing in the Dumont mill with cyanide. Francis Burton, Dumont, Colo., is manager.

Nemeha.—Local lessees have opened into some very good ores in the 450 workings on the Cotton on Bobtail hill, shipments this past week giving returns of 13.77 oz. gold, 30 oz. silver, and 15 per cent copper per ton. E. S. Moulton, Central City, Colo., is owner.

Old Daugherty.—Local parties have taken a lease and bond on this property in Lake district, with Gus Bensfils, of Central City, Colo., in charge of developments. Considerable dead work is necessary, as the property has been idle for nearly thirty years; previous to that it was credited with a production of $50,000.

Pozo.—The shaft is down 140 ft., and is to be sunk 100 and possibly 200 ft. deeper. A good grade milling, also lead smelting ores have been taken out.

Prize.—An examination is being made of this property in the interests of the Guggenheim syndicate by J. B. Hastings, its representative from British Columbia.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

Coronado.—The large station at the bottom of the shaft is nearly completed, and when finished drifting will be started north and south to develop the orebodies caught in sinking. The Penrose shaft will start sinking by the middle of the month. From the upper workings of the Coronado 150 tons a day are being sent to the smelter.

Fanchon.—Good progress is being made in sinking the shaft, and a tunnel will be started from the north side of the hill this month, and when completed will cut the bottom of the shaft, 450 ft. deep.

Fryer Mill Mines Co.—This mine is shipping steadily its regular quota of ore from the El Paso, Cora Belle and Bangkok, Jimmie Lee, Slicer, Harvard and Pride of the West. In the northern part considerable work is being done in virgin territory, and at present the outlook is very encouraging for opening up a body of ore.

New Monarch Mining Co.—This company is operating three shafts in Evans gulch. It ships a heavy tonnage of oxidized and sulphide ores. In addition to this, a large body of low-grade ore, running $10 per ton, has been opened for 1,500 ft. It is 40 ft. wide. The company is at present experimenting with different milling processes, with the intention of putting in a mill of its own to treat this ore body.

Revenue.—A shaft was sunk on this property several hundred feet a few years ago, and after doing considerable prospecting work the lessees gave it up. It is situated about two miles below the Reindeer, on Rock hill, and from later developments proves that the shaft is not deep enough. The owners of the ground will meet shortly and decide what is to be done.

Rock Hill.—The Bessie Wilgus shaft is being sunk with dispatch, as well as the new shaft of the Iron Mining Co. and the one by John Murphy. On the southern slope of the hill W. E. Bowden has put in a new plant of machinery at the President, and the work of sinking will start next week. He has secured a lease on the Buffalo, Comstock, and Fraction No. 1, and will sink a shaft about the center of the three. The Reindeer is shipping steadily 100 tons daily, and the output could be increased if the smelter could handle it.

SUMMIT COUNTY.

(From Our Special Correspondent.)

A large amount of placer mining has been done during the past season; numerous good clean-ups have been made, and the season is reported to have been a productive one in every sense. Indications point to still heavier operations during the next season.

Cashier.—An additional 20 stamps are to be added to this mill at Breckenridge, and it is expected that with 40 stamps the product of the company's property can be handled. J. Wood, Breckenridge, is manager.

Colorado & Wyoming Development Co.—Breckenridge capital is interested in the operating of this company's property on Mineral hill. The production is averaging 40 tons per day of zinc ores, which are shipped to Canon City for treatment.

Jessie.—New equipment, consisting of new compressor and drills, has been installed; some necessary dead work has been attended to in the mine, the mill has been overhauled, and new concentrating tables set up.

Mt. Quandary Co.—Manager Strickler, of Breckenridge, Colo., reports that the capacity of the mill is to be doubled, and that a tramway is to be constructed between mine and mill for the economical handling of the ores. The addition and tramway are to be completed during the winter months.

Reliance Gold Dredging Co.—Machinery and lumber are on the ground for the new dredger in French gulch, which is to be completed before next spring. E. L. Smith, Breckenridge, is manager.

Ohio & Pennsylvania.—A force of 40 men is employed at these properties at Argentine, under management of W. B. Le Wald. The mill, which has been run by water power, is being fitted with steam power, so that they can run for the entire year. A good product is being kept up, one-third of which goes to the smelters.

Old Union Mining & Milling Co.—This company has decided to erect its own concentrating mill at the mouth of the new tunnel, expecting to have it in readiness by next spring.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

El Paso Consolidated Gold Mining Co.—The output for this property for the month of September amounted to about $110,000, and it is understood that the net profit to the company was $70,000. This property is not only the banner property of Beacon, but is one of the foremost mines in the district. Wm. Bainbridge is in charge of the mine.

Golden Wedge.—Arthur and associates have obtained a lease on this property and have started work with a small force of men. The property is situated near the Ophir Co.'s. property, on Raven hill.

W. P. H.—This property still continues to ship considerable ore, and while it is not so rich as the phenomenal ore that was shipped out last February, it is still of a very good grade. The property is being worked by several sets of lessees.

IDAHO.

CUSTER COUNTY.

Golden Sunbeam Mining Co.—This company is grinding 50 tons of ore daily with two Elspass mills. The deposits of free gold are said to be large. G. E. Goble is manager.

IDAHO COUNTY.

Dewey.—The dam at this property, in the Clearwater country, which was washed away by floods last year, is being rebuilt.

LATAH COUNTY.

Jericho Mining Co.—Considerable work has been done on this company's property, in the Burnt Creek mining district. The mill will be started this winter.

Moscow.—it is reported that the opal mines at this place are to be re-opened.

SHOSHONE COUNTY.

Monarch Mining Co.—Application for an injunction against this company has been made by Mrs. Elizabeth Darling, of Spokane, who alleges that $18,000 is due her on the purchase price.

Snowstorm.—This mine, near Wallace, is shipping 150 tons daily.

MONTANA.

(From Our Special Correspondent.)

BROADWATER COUNTY.

East Pacific.—The total production from this property to date amounts to about $1,275,000. The September returns are $13,000. A pocket of rich ore 30 in. wide, assaying $36,571 per ton—gold, 1.822 oz., and silver, 2.28 oz.—has been uncovered in the lowest level. This find is 900 ft. below the surface and seems to be extensive. The property has been idle for three years up to three months ago. R. A. Bell, of Helena, is owner. He intends to add heavy machinery, including a larger compressor and hoist, and will erect a 100-ton concentrator.

H. & H.—This property, formerly worked by the Custer Syndicate, is under option to Helena parties, who are unwatering the old workings. The property is three miles from Winston and was a shipper for some years. The ore is an iron sulphide, and under the former operations shipped about $40 gold per ton.

New Era and Park.—Allen Mason, of Helena, has secured these two adjoining properties by a bond to purchase, and is driving a 1,400-ft. tunnel to tap the claims at a greater depth. A concentrator will be erected shortly for working the dumps of second-class ore, which have accumulated for 20 years or more at both mines. The property is 6 miles above Hassel.

FERGUS COUNTY.

Kendall.—Diamond drill work on this property, at Kendall, has reached a depth of 870 ft., without encountering any material change in the character of the orebody. The oxidization extends to that depth.

GALLATIN COUNTY.

Montana Corundum Co.—There is a movement to consolidate this property with the Bozeman Corundum Co. and to dispose of the consolidated property to an Eastern concern that is handling and manufacturing corundum products. The dressed mineral has found favor where it has been marketed. The demand, owing to the present financial condition of the company, cannot be met.

POWELL COUNTY.

Arnold.—This property, near Elliston, is shipping copper ore to the Tacoma (Wash.) smelter. The last 16-ton shipment netted $620. The ore is a carbonate. The mine is in a lime formation. It is owned by Dr. G. E. Blackburn, of Butte.

Potosi.—The tunnel on this property has reached a length of 460 ft. Cross-cuts each way will be run to tap two leads which show on the surface. The stock of the company is held in Butte. S. R. Graves is secretary.

Gold Creek Placer Mines, Ltd.—The new dredge boat building by this company, near Gold Creek station, is ready for placing the machinery, which is all on the ground. The machinery is of the Bucyrus type, with 5-ft. buckets.

SILVER BOW COUNTY.

Rarus.—It is reported that a large orebody is being opened up on the 1,600-ft. level of this property. The mine has always been the mainstay for the Montana Ore Purchasing Co. The extent of the present showing is not as yet fully developed. A new compound compressor, of probably 300 h.p., will take the place of the two smaller ones now used.

Reins Copper Co.—Steady improvement is reported in the size of the ore struck recently in the cross-cut at the 800-ft. level on this property. New ore bins are being erected at the shaft; 600 tons have been shipped to the Colorado smelter.

NEVADA.

ESMERALDA COUNTY.

Red Top.—On the Marcus sub-lease at this mine, at Goldfield, 8 ft. of ore are reported at grass roots.

Quartzite.—A strike of good ore is reported at this mine, at Goldfield.

Sandstorm.—A shipment of 15 tons has been sent from this mine, at Goldfield.

LINCOLN COUNTY.

Manila.—A half interest in this group of 14 copper claims, near Goode Springs, has been sold to Marcus P. Lincoln for a reported price of $6,000.

ORMSBY COUNTY.

Several carloads of silicon or infusorial earth have been shipped to New York from deposits in the Chalk hills, seven miles northeast of the Comstock.

NEW MEXICO.

DONNA ANA COUNTY.

Mormon Mining & Milling Co.—A concentrating plant is to be erected on this company's property, at Gold Camp.

GRANT COUNTY.

National Gold & Silver Mining Co.—On this company's property, at Stein's Pass, the water-bearing stratum has been entered at a depth of 850 ft. A deep-well pump is to be installed.

SANTA FE COUNTY.

Ortiz.—It is reported that an Eastern syndicate has secured a lease on this placer ground and will erect a placer plant near Dolores.

SOCORRO COUNTY.

Graphic.—A rich body of lead carbonate is reported to have been uncovered on this property, at Magdalena.

OREGON.

BAKER COUNTY.

Blue Bird.—A 100-ton cyanide plant will be installed at this mine, at Sumpter. Recent developments are said to have been very promising.

Equity.—This mine is now shipping ore to the Sumpter smelter.

GRANT COUNTY.

Bull of the Woods.—Work is to be resumed on this property near Susanville. A compressor plant is being installed.

JACKSON COUNTY.

Gold Hill Development Co.—This company has completed arrangements to instal a power plant and custom smelter on its property at Gold Hill.

JOSEPHINE COUNTY.

Oregon Belle.—A 10-stamp mill is to be installed on this property at Grant's Pass.

PENNSYLVANIA.

ANTHRACITE COAL.

Delaware, Lackawanna & Western Coal Co.—This company's Bellevue and Auchincloss mines, which have been idle for six weeks for repairs, have resumed operations. The Avondale, which was idle a month on account of fire, is also working again. All the company's collieries in the Wyoming and Lackawanna regions are running on full time after the autumn restriction.

Finn Coal Co.—This company's new breaker, near Carbondale, is now in operation.

Natalie Coal Co.—The property of this company, at Mt. Carmel, was sold on October 6 by the receiver for $480,000 to the Buffalo Coal Co.

Philadelphia & Reading Coal & Iron Co.—The 1,250-ft. shaft at this company's mine at Pottsville is completed. It will be one of the largest producers in the lower anthracite region.

BITUMINOUS COAL.

Baltimore & Ohio Railroad Co.—It is reported that this company will construct a branch line from Smithfield up York run, a distance of about two miles, where it will tap 500 coke ovens being built by the H. C. Frick Coke Co.

Douglas-Paugh Coal & Coke Co.—This company has purchased the property of the Phœnix Coal & Mining Co., at Clarksburg.

Hill Coal Co.—This company has sold its mine in Jackson county to H. K. Wick, of Youngstown, Ohio, who is now operating it. The property includes about 230 acres.

Latrobe Coal Co.—This company has contracted for a coal crusher and engines to be installed on the tipple at its plant at Greensburg.

SOUTH DAKOTA.

(*From Our Special Correspondent.*)

CUSTER COUNTY.

Extreme Mining & Milling Co.—A tramway has been completed between the mine and the mill, and the latter has resumed operation. W. N. Wright is in charge.

LAWRENCE COUNTY.

Columbus Consolidated Gold Mining Co.—William Sauntry, of Stillwater, Minn., has been elected president under the re-organization, and H. J. Mayham, whom he succeeds, is vice-president. Dr. A. Z. Conrad, of New York, is secretary. Prof. Saddler, late professor of metallurgy in the Colorado State School of Mines, has completed an extensive examination of the property and has forwarded several hundred pounds of samples to Denver.

Dakota Mining & Milling Co.—The installation of the new steam hoist at the shaft on this company's property is complete, and sinking has been resumed. This shaft is 165 ft. deep, and 90 ft. of it is ore in the Cambrian measure. It is intended to go to quartzite, which is estimated to be from 500 to 600 ft. deep at that place. The company's mill at Deadwood is running regularly, treating on an average 119 tons a day, and cleaning up twice a month.

Gilt Edge-Maid Mining Co.—The new mill will be started November 1. The machinery and other material have arrived and the transmission line from the power plant of the Belt Electric Light & Power Co. at Pluma has been completed, having a length of over six miles, and costing $1,000 a mile.

Gold Eagle Mining Co.—The quartzite shaft is over 50 ft. deep and has about 75 ft. to go.

Homestake Extension Mining Co.—Final payment has been made by this company on the property purchased of Henry T. Billings & Sons, and title now rests with the company. The contract has been let to M. J. Donovan and Hiram Hilton, of Deadwood, to drive a 400-ft. development tunnel. The company is incorporated under the Arizona laws, with a capitalization of $5,000,000, with 5,000,000 shares. The property adjoins the Homestake and consists of 77.8 acres. The officers are Chicago and Elgin (Ill.) people.

Imperial Gold Mining & Milling Co.—The Ingham, Winnescheick and File Closer Fraction and a half interest in the Elk Mountain group have been purchased of John A. Greenough for $5,200. About 40 acres are included. The company worked the Ingham, Winnescheick and File Closer under lease last year and removed considerable ore for milling.

TENNESSEE.

CUMBERLAND COUNTY.

Tennessee Lumber & Coal Co.—The mines of this company at Ozone have been leased for 10 years by N. C. Chapman and others, of St. Louis.

UTAH.

(*From Our Special Correspondent.*)

Ore and Bullion.—Salt Lake banks reported settlements during September to the amount of $1,995,218.

BEAVER COUNTY.

Blackbird Copper.—Nothing but the assessment work will be performed on this property during the present year.

Indian Queen.—The tunnel being driven on this property, and which is intended to cut the ore-bodies at great depth, has been completed to about the 300-ft. point. By driving it 100 ft. further the Mountain Queen vein will be encountered, if the dip continues as indicated nearer the surface. More than $200,000 worth of ore is said to have been extracted from the Mountain Queen vein in the early days of mining in Utah; ore from it was smelted in the first furnace erected in Beaver county.

Majestic Copper.—Development at this property is progressing in a satisfactory manner. Seven cars of ore sent to the Salt Lake market are said to have given gratifying returns.

JUAB COUNTY.

Bullion-Beck Tunnel.—This mine is to be equipped with a new compressor plant. Jesse Knight, of Provo, is manager.

Mammoth.—This company's mill is in operation again. Sixty stamps are dropping. The shaft is now down 1,950 ft.

May Day.—This company has purchased a fractional claim of two acres to round out its group. The property is between the original May Day ground and the Uncle Sam Consolidated.

MILLARD COUNTY.

Oasis Gold & Copper Co.—A shipment of ore was settled for this week on controls, showing values of $19.20 in gold, 10 oz. in silver, and 4.3% in copper.

PIUTE COUNTY.

Annie Laurie.—The mill at this mine, with the new equipment, is in operation.

Bradburn.—Development work at this property is progressing favorably. Ore was recently uncovered in the upper tunnel.

SALT LAKE COUNTY.

Bingham Consolidated.—Copper bullion shipments from this plant in September aggregated 1,086,700 lb., and during the week ending September 30, 304,628 lb.

Copper Belt Railway.—Arrangements have been practically completed for the extension of the tracks of this road to the Utah-Apex and Bingham-New Haven mines, in Bingham. The former mine is shipping about three cars a week, the latter about 50 tons daily.

Maxfield.—Extensive shipments of ore from this property, in the Big Cottonwood mining district, are being made. A. L. Thomas, of Salt Lake, is manager.

Ohio.—With the new equipment recently added, this mill, at Bingham, is handling about 120 tons of crude ore daily.

United States.—The shipments of copper bullion from this property during the month of September aggregated 1,061,740 lb., and for the week ending September 30, 240,390 lb.

Utah-Apex.—Work has been started on the 3,000-ft. tunnel, which is intended to tap the orebodies of the property from 800 to 1,000 ft. lower down.

Utah Consolidated.—Shipments of copper bullion from this plant in September aggregated 1,540,896 lb., and during the week ending September 30, 371,097 lb.

SEVIER COUNTY.

Sevier Consolidated.—It is expected that the mill at this mine will be placed in commission at once. A test run, made a few days ago, is reported by Manager Henry C. Lawrence, of Salt Lake, as being satisfactory.

TOOELE COUNTY.

Buckhorn.—The management of this mine has arranged to have a large tonnage of ore from this property milled at the plant of the Ophir-Hill Mining Co. It also has been decided to push development work more vigorously. Machine drills will be operated with power furnished from the Ophir-Hill mine.

Stockton.—Progress is being made with the construction of the concentrating plant at this mine. It will be completed in about 30 days and will have capacity for treating 60 tons of ore daily.

WASHINGTON.

(*From Our Special Correspondent.*)

FERRY COUNTY.

Belcher.—The first shipment of ore from the three levels of the mine, aggregating 100 tons, has gone to the Granby smelter.

Jupiter Ammon Mining Co.—This company has been incorporated by E. R. Fraser and Charles Garber, of Spokane, and J. L. Harper, W. T. Beck and J. C. Kerley, of Republic, to develop the Shamrock mine, on Belcher mountain, east of the Belcher mine. J. L. Harper is general manager.

Mountain Boy.—The Midnight Mining Co. will vigorously prospect this property, at Park City, on the south half of the Colville reservation. C. S. Verrill is the superintendent of the Mountain Boy, and J. L. Harper is the manager of the Midnight Mining Co.

Mountain Lion.—The mine has been closed down until November 1, the smelters having no present need of more ore from it.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA.

Yukon.—Official proclamation has been made ordering a redivision of the mining districts of Sixty-mile and Dawson, by which a section from the latter district—the territory tributary to the Sixty-Mile river, including Boucher creek and excluding Gold creek—is added to the former. The rearrangement will, it is said, greatly convenience miners working on, and in the vicinity of, Boucher creek.

The Coast.—Work has been resumed at the No. 1 colliery, Nanaimo, with the employment of 400 men. The company has entered into new arrangements with the miners in respect to hours of labor and other details.

Intelligence has reached Vancouver that the Western Oil & Coal Co., which recently acquired, in addition to its other properties, 16 claims near the Flathead district, has exposed a 20-ft. seam of bituminous in a cutting made through its property by the Great Northern railway. The company already has struck oil in one of its wells.

It is reported that steps have been taken for the reopening of the Alberni Consolidated mine, at Alberni, a syndicate of Spokane investors having recently secured an option on the property with this end in view. In the operation of this mine in the past money was

very recklessly wasted, as a result largely of bad management, but at the same time geological conditions in the locality are themselves far from favorable, and the present proposal to rework the mine can only therefore be regardde as somewhat in the nature of a "forlorn hope," all the more creditable to the originators if it be brought to a successful conclusion.

Kamloops.—Operations are now in progress at the Iron Mask mine, which was recently equipped with concentrating and other machinery.

Slocan.—The Kootenay Ore Co., at Kaslo, has already begun breaking ground for a building 80 by 100 ft., in addition to the present works, in which, during the next two months, the most modern machinery for zinc separation on a large scale will be installed. The Ibex, at one time advertised in the Toronto papers as having $2,000,000 worth of ore in sight, is now being advertised for sale to satisfy a judgment of $1,406 obtained against it by several Kaslo miners.

Rossland.—Concentration operations have been somewhat interfered with by a shortage of water consequent upon an unusually dry summer. The chief news of importance is that the output of Le Roi is being increased to the extent of 50 tons daily, and that it is proposed to increase the capacity of the Velvet plant.

Boundary. — The Greenwood-Strathmore Mines, Ltd., is being formed, with a capital of $125,000, in 25 cent shares, to operate the recently bonded Strathmore claim, near the Providence mine.

East Kootenay.—The Perry Creek Hydraulic Mining Co. has completed the work of installing an important plant at Perry creek, by which the stream has been diverted from its course into a flume 4 by 4 ft., and carried a distance of about four and a half miles, with a fall of approximately 600 ft. It is now proposed to work the creek-bed, which has been systematically prospected. The company has expended over $100,000 in the work to the present time.

Preparations are being made for an early commencement of regular production from the Sullivan mine.

Coal trade conditions in East Kootenay are reported to be very satisfactory, coke and coal sales of the Crow's Nest Pass Coal Co. having been recently increased by special orders from the Great Northern railway for 850 tons of coal daily.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending October 1 were as follows, in tons: Granby, 10,800; Brooklyn, 713; Mother Lode, 4,288; Sunset, 273; Emma, 1,221; Mountain Rose, 132. Total for the week, 17,427 tons; total for the year, 600,126 tons.

Granby Consolidated Mining, Smelting & Power Co.—The annual report of this company, just issued, shows an increase in production for the year of over 3,473,000 tons of copper, or a total of 16,024,415. Of silver, 275,960 oz. were produced, and of gold 54,231 oz. Gross receipts were increased by $695,095, but operating expenses were also increased by $707,879, so that there was a decrease in net profits of $12,784, or a total of $283,514.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending October 1 were as follows, in tons: Le Roi, 1,350; Centre Star, 1,440; War Eagle, 1,410; Le Roi No. 2, 370; Le Roi No. 2, milled, 300; Jumbo, 300; Velvet-Portland, milled, 250. Total, 5,120 tons. This year to date, 263,302 tons.

Ontario.

The water power at High Falls, on the Spanish river, is to be utilized for supplying power to the works at Copper Cliff, it is expected, within the next year, and the line will run along the north side of the right-of-way of the Sault Ste. Marie branch of the Canadian Pacific railway for about 30 miles. The posts are to be from 35 to 40 ft. high, and strung with six wires at the start. It will also furnish power and light to any intervening points.

MINING STOCKS.

(Full quotations on pages 615 and 616.)

New York. Oct. 12.

A better feeling prevails in the stock market, and substantial advances have been made in the prices of copper and steel shares. In some quarters buying is for investment—a good indication that present prices are tempting. Profit-taking is less in evidence, because the supporters of the market appear more anxious to improve conditions than to clip the wings of a timid public.

Amalgamated Copper shows a gain of 2.75 points to $63.75; this price establishes the high record for the year, and is equivalent to a recovery of nearly 50% from the low mark in February. It is only $11.875 less than the maximum price last year. Anaconda has made a sympathetic advance of 3.25 points to $25.50, the top notch this year. Tennessee rose to $33 on larger trading. Greene Consolidated is in good form, selling up to $20.625. British Columbia was a little more active at $4.625. White Knob, of Idaho, is in the dumps, selling at one-tenth its par value. United common made another sale at $6.

American Smelting & Refining shares were strong, the common moving up to $66.50, and the preferred to $107.

United States Steel, being well supported, exhibited particular strength in the preferred shares, which made a new high record at $77.375 on larger trading. The common stock touched $19.125, which is more than double the price obtained last May, when rock bottom was felt.

Horn Silver, of Utah, continues firm at $1.65. Elkton, of Cripple Creek, Colo., holds at 62c., and Ophir, of Nevada, at $2.70.

At the close to-day advances were general, and continued improvement is looked for in the high-priced shares.

Boston. Oct. 11.

(From Our Special Correspondent.)

At last the mining share market is responding to surrounding conditions, and a strong, healthy market has been witnessed during the past week. The position of the metal has certainly stimulated the share market, and brokers have had a busy time. Some stocks have actually boomed, and withal it is a broad, active market. Stocks advance easily, and offerings are light, in comparison to the advances recorded. Tamarack made a $9 advance in the two hours of trading Saturday, touching $128. It has since settled to $124, which is $6 above a week back. Semi-officially, it is announced that no dividend need be expected this year, as the cost of repairing No. 2 shaft and the coincident curtailment of production materially increased the cost of copper. Net earnings this year are estimated at about $100,000. Osceola boomed $9 to $91, re-acting but $1. Dividend prospects in this case are soon to be realized, it is expected. Calumet & Hecla is up $35, to $555, on rather more business than usual. An unusual thing was the sale of 100 shares in one lot to-day at $540.

Fluctuations in Allouez have been rather violent, the stock running off from $13.25 to $11.50 and back to $13.25 again. Although the Kearsarge lode has been struck by the diamond drill, it will be several weeks before the contents of the lode can be determined. Brokers consider it significant that many buying orders are coming from the old miners at the Lake. Old Dominion attracted attention by advancing $2.75 to $22.25, and Shannon responded to favorable advices from the mine, by advancing $1.25 to $6.25. Copper Range has again been taken in hand, and is up over $4, to $62. This stock has been the most active one on the list the past three or four days. Wolverine has worked up $6.50 to $96; Atlantic, $1.25 to $14.25; Bingham, $2 to $28.50; Centennial, $1.25 to $28.25; Michigan, $1 to $8.25, and Mohawk, $2 to $49, but free offering caused the latter to fall back to $47.75. Quincy is up $4.50 to $94.50, and Winona $1.12½ to $9.62½. Isle Royale, which was pressed for sale last week, touched $19.75, but easily recovered to $22.

Trinity touched $8.75 during the week, but lost a part of it. The annual report, issued to-day, says that total expenditures for the year have been $24,323, at the mines, including the manager's salary and lawyer's fees. At the Boston office expenditures have been $4,205, including New Jersey taxes, etc. President Thomas W. Lawson says the policy has been a waiting one the past year. The most important work was the patenting of the properties.

It is more than probable that Greene Consolidated Copper certificates will be traded in on the local exchange before the week is out. The listing of the stock has been ratified, and certificates are being printed, which will bear the name of a Boston transfer agent.

A burst of activity put Santa Fe mining to $2.12½ this afternoon.

Colorado Springs. Oct. 7.

(From Our Special Correspondent.)

In the past week trading was light on some days and heavy on others. But, on the whole, the market has been of a very satisfactory nature.

The output of the Cripple Creek district for September was in excess of $2,000,000, which is the largest output of the camp for a good many months. The camp is getting back into its old prosperity and its present rate of production should be maintained or increased in the future. Everything points to this end.

El Paso has been the feature of the week, jumping up to $1.05, a gain of about 7.5c. over last week. It is reported from semi-official circles that this company will increase its regular dividend from 1c. per month to 2c. This, together with the large output of this mine each month, seems to be the cause of the rise.

The stockholders of the Findley have voted to consolidate with the Valley City, which owns adjoining property.

Elkton sold to-day for 62½, a gain of 1½c. over last week. Isabella sold for 18¼, a slight decrease. Portland sold for $1.70, a gain of about 5c. over previous sales. No C. K. & N. was sold during the week, but 20 was bid today. Vindicator is quoted at 65@68c. per share.

Salt Lake City. Oct. 8.

(From Our Special Correspondent.)

The tone of the mining stock market has been better during the past week, and there is a growing belief that the fall and winter months will record a good trade. The trading was largely confined to the Tintic stocks. May Day was the star actor, but at no advance in price, 14c. being the highest and 12¼c. the lowest price paid for it. Uncle Sam Consolidated strengthened considerably, and close to 12,000 shares changed hands. The directors have posted a dividend of $5,000, which is payable on October 21. Consolidated Mercur has also made some gains, on the strength of a continuation of good reports from the mine. Tetro recovered, and 28c. was bid freely for it towards the close of the month. Sacramento received little call, however, the price remaining fairly firm. The $100,000 dividend of the Silver King was paid during the week.

San Francisco. Oct. 5.

(From Our Special Correspondent.)

The past week has been the most active, so far as the Comstocks were concerned, that we have seen for a long time. The movement was started by reports of continuous improvement on the 2,200 level of Consolidated California & Virginia. Little attention was paid to this at first, but gradually the market took it in, and that stock and Ophir began to go up. The rise attracted buyers, naturally, and finally there was almost a rush to purchase, with more outsiders ready to operate than we have been accustomed to of late years. Consolidated California & Virginia went up as high as $2.60 today, with reaction to $2.40, while Ophir touched $3.20, with reaction to $2.80. Naturally, these high prices for the leaders helped along the other stocks to some extent, and there was more or less trading all through the list. Other prices noted are: Best & Belcher, $1.45; Mexican, $1.40; Exchequer, 65c.; Sierra Nevada,

52c.; Hale & Norcross, 66c.; Savage, 38c.; Potosi, 21c. per share.

On the San Francisco & Tonopah exchange business was also good, though not quite as lively as with the Comstocks. There was considerable fluctuation in prices, and business upon the whole was good. Tonopah, of Nevada, sold at $8.25@$8.50; Goldfield, Nevada, 70c.; Tonopah Belmont, 63c.; Tonopah Midway, 42c.; MacNamara, 36c.; Tonopah North Star, 15c.; Adams Goldfield, 12c. per share.

On the California exchange business in oil stocks was moderate only, but prices were generally steady. Twenty-eight sold at $10; Caribou, $4.50; Claremont, 80c.; Monte Cristo, 65c.; Apollo, 40c. per share.

Monterey. Sept. 30.

(From Our Special Correspondent.)

Exchange on New York has risen from 215 to 215⅞, closing Saturday at 215⅝.

Mining stocks were very dull, the only sales reported being of Dos Estrellas, at $2,200; Aldebaran, $57; Reforma, $28, and La Paz, Matehuala, $210. In Pachuca properties, La Blanca sold at $390; Amistad y Concordia, $74, and Santa Gertrudis, $77.

COAL TRADE REVIEW.

New York, Oct. 12.

ANTHRACITE.

After all, it now appears the Hearst suit against the anthracite railroads is to be taken up again by the Interstate Commerce Commission. Coal prices now interest the common people, and a national election is near, hence red ink fulminations against the Coal Trust will be listened to with more attention than they would have been in the summer time. This may not be the reason why the suit has been held back for some months, but the chances are that it will not be pushed hard after election. The hearings were to have been held in Chicago, but were adjourned to this city, to begin on October 24. The specific matter to be investigated now is the coal dealers' association in Chicago. This association has its counterpart in every town of any size in the West—but the plaintiff's attorney claims to see in it a combination in restraint of trade, and asserts that there is a close connection between anthracite sales agents in Chicago, who are members of the association, and the New York offices of the same companies. It is generally known that the Chicago sales offices are differently managed from those in New York, and the connection in price schedules is not close, but the plaintiff's attorney is evidently working up a big sensation—the extent of the territory oppressed by the Coal Trust. Hence the Chicago coal dealers' association should be prepared for some heavy red ink broadsides, as the plaintiff's attorney will probably succeed in showing that the association is a body that meets at regular intervals, and is interested in maintaining the prices of coal.

The official estimate of September shipments gives the total movement by rail from the breakers as 3,967,600 long tons, a decline of 686,854 tons from the 4,654,454 tons of August. The total movement for nine months this year was 42,173,828 tons, compared with 47,096,293 tons for the corresponding period of last year, a decline of 4,922,465 long tons. The principal companies continue to restrict the output of their collieries.

All sizes of coal are in sufficient supply, the prepared in particular. The steam sizes are scarcely pressed for sale as they were, and for the free-burning grades of the smallest sizes, buckwheat No. 2 and No. 3, the demand is distinctly strong. Producers of the harder grades of coal report that their steam sizes move very slowly. Considering the market conditions, it is an open question whether certain companies in the Lackawanna-Wyoming region have not really been reducing their assets to little advantage by cleaning up culm banks as rapidly as they have been doing for a few years past, for a culm bank can be kept until wanted at little expense.

The trade generally shows more activity. At the head of the lakes, owing to the slow movement to inland points, docks are congested, and lake receipts have fallen off. In Chicago territory, after a little rush of buyers to get supplies, trade declined again, and at out-of-town points is quiet. Consumers evidently think they will be able to get coal as they need it. Along the lower lakes and in Canadian territory the market is quiet. There is some improvement in line business. At points along the seaboard demand is rather slow and irregular. The prepared sizes are all in plentiful supply, and dealers generally are in no hurry to buy. Prices are well maintained by producers, and there has been little coal sold at below circular figures this fall. Evidently cold weather will bring out good buying. The f. o. b. New York harbor quotations for free-burning white ash coal are: Broken, $4.75; egg, stove and chestnut, $5.

BITUMINOUS.

In the Atlantic seaboard bituminous trade there seems to be a fair amount of coal going forward, but few people claim to have more orders than they can attend to, still most shippers are receiving orders enough to keep their mines operating nearly full time. Some competition is noted from the small size of anthracite.

The chief matter of interest this week is the bad break in the coastwise freight rates, resulting from the Coastwise Carriers' Association lapsing on October 1. Freights have broken to 60c., and even less, from the lower ports to Boston. This rate is, with the higher labor market, and cost of supplies, probably below cost, and will do more than any association agreement to tie up vessels.

In the far east considerable coal is arriving, but it is felt that stocks on hand in that territory are light. Along Long Island sound there has been some improvement, especially at the west end of the sound, where tonnages are reaching nearly their old-time volume. At New York harbor points trade is quiet, about the usual tonnage going forward without attracting attention. Current prices are: $2.25 for gas slack and $2.40@$2.50 for Clearfield, with specialties ranging up to $3.25; all these prices being f. o. b. New York harbor shipping port. In the all-rail markets demand has improved slightly.

Transportation from the mines to tidewater is irregular and slightly slower than it has been. Car supply on the Pennsylvania and the Baltimore & Ohio is up to all demands. On the other roads it is short. In the coastwise vessel market vessels are plentiful, especially those of larger size, and rates are weak. We quote from Philadelphia as follows: Providence, New Bedford and Long Island sound, 50c.; Boston, Salem and Portland, 60c.; Portsmouth, 65c.; Lynn and Newburyport, 75c. From New York harbor rates are 50c. to points around Cape Cod.

Birmingham. Oct. 10.

(From Our Special Correspondent.)

The coal production in Alabama continues to improve, though the strike of the union miners is still on, and the leaders claim that their men are remaining firm. The operators are still bringing in non-union men to the district and putting them to work, while a number of former union men are working in the mines. The Tennessee Coal, Iron & Railroad Co., having started up its mines in the Blue Creek region, Jefferson county, and in Blocton, Bibb county, has also commenced working in the Pratt Mines division, Jefferson county, during the past week, putting men in shaft No. 1. The Sloss-Sheffield Steel & Iron Co. has all its mines producing more or less coal. The Lacey-Buek Co. has its mines at Graves' completely filled with non-union men and the production is steadily increasing. President Ed. Flynn, of the miners' organization, asserts that the coal being produced with the non-union miners is not the best, and that it is proving quite expensive to the companies. The production at non-union mines and where union miners are employed under a temporary contract is as heavy as it ever was. There is a fine demand for the product at good prices and the railroads are handling the product about as well as could be expected. There is no delay to be heard of. State Inspector J. M. Gray states that the production is as healthy as it could be expected. During the past 10 days two more fatal accidents were added to the list, running the total fatality list for the year over 00, against only 57 for the entire year of 1903.

The Blount Mountain Coal Co. has filed incorporation papers in the probate office here, capital stock $50,000, and is making preparations to open mines in Blount county.

The Barge Line Coal & Coke Co. has filed articles of incorporation in the probate office here, capital stock $25,000. The incorporators are J. W. Miller, of Green Pond, Tuskaloosa county; F. G. Moore, of Ensley, Jefferson county; J. W. and F. Vandenhuerk, of Vance, Tuskaloosa county, and T. H. Moore, of Tidewater, Tuskaloosa county. The purpose of the corporation is to operate coal mines and to lease and construct barges and other vessels for the transportation of coal and coke. Tidewater is near the Warrior river—in the Tuskaloosa coal-field.

Chicago. Oct. 10

(From Our Special Correspondent.)

Slowly, but surely, sales of anthracite are increasing. The increase is not nearly up to the hopes or, indeed, the expectations of wholesalers, who throughout the dull summer season consoled themselves with the idea that there would be briskness, in the cities at least, with the coming of frosts and the return of householders from the country. To some extent these hopes and expectations have been fulfilled; city trade throughout Chicago territory is better, but it is not up to the standard set by previous years at this season. In the country, trade is dull and orders are spasmodic; dealers apparently are yet reluctant to lay in stocks for the winter, and they cannot induce householders to buy for the season, as formerly. It is probable, also, that consumers feel confident that the anthracite business will continue stable and that they can get coal promptly when it is needed. Whatever the cause, the business continues to languish, and nothing short of really cold weather will stimulate it to normal activity.

In the bituminous trade there is still great weakness in the market for fine coal from western mines, and the general trade is far from being satisfactory to wholesalers. The demand is fairly normal, but the supply of western is too great. Screenings and slack are being dumped at the mines rather than send shipments to Chicago at prices which in some cases have only paid the freight. Run-of-mine brings $1.40@$1.60, and steam lump $1.55@$1.65. Domestic sizes are in a little better demand, but the increase is slow.

Eastern coals are on a fairly steady basis; sales are neither extraordinarily small, nor large, and prices hold up well. Smokeless is free from its old trouble of too large shipments, and shows no weakening; it brings $2.80@$3. Hocking is steady and selling well, with the price about $3. Youghiogheny is in comparatively good demand and brings $2.90@$3. Pittsburg is in fair demand at $2.65. West Virginia splint is selling well at $3.25@$3.50.

The Secretary of War has issued an order extending the time for lowering the tunnels in the Chicago river one year, or until April 15, 1906. Largely through the efforts of local firms receiving coal by lake, the former date of April 15, 1905, was established, and these firms must continue to do business in light-draft vessels for another year to their great disappointment.

Cleveland. Oct. 11.

(From Our Special Correspondent.)

The coal trade is slightly improving, although there has been no radical upward movement of prices. The steady gain over former conditions, noted a short time ago, has been continued. Industrial concerns have been steady buyers of coal, and the industrial situation is improving gradually. This is aided by the better condition in which the railroads find themselves for handling coal. The congested condition prevailing a week ago has been cleared up to a great extent, and the movement is now free. Prices for steam coal hang around $1 at the mines. The sudden burst of warm weather has not been conducive to any increase in the sale of soft coal for domestic use, and the market has been rather easy. The

demand for slack has been a little better, and prices are stiffening, running from 30 to 40c. at mine, with a good demand and shipment free. There is a movement for the resumption of work in many of the furnaces. Many of the foundries have also started again. This will bring about a better demand for coke. Many of those who had bought, but had not been receiving material on their contracts, have now begun to specify. Shipments are steady and prices good.

Pittsburg. Oct. 11.

(From Our Special Correspondent.)

Coal.—The demand for coal is increasing and prices are firm. Late in the week there was a shortage of railroad cars, and the Pittsburg Coal Co. was forced to close 16 mines. Yesterday the week opened with a full supply of cars, and all the railroad coal mines are in full operation. The Fayette City mine, of the Monongahela River Consolidated Coal & Coke Co., was put in operation yesterday, and there likely will be a general resumption at the river mines within the week. There are plenty of empty coal boats and barges in the pools and harbor. The question of operation of the mines of the Pittsburg Terminal Railroad & Coal Co., recently acquired by the Wabash Railroad, has not yet been decided. It is reported to-day that the Pittsburg Coal Co. will get control of these mines. Prices are firm, and run-of-mine coal is still quoted at $1.05@$1.10 at the mine.

Connellsville Coke.—The production of coke in the region was greater last week, but the shipments were less than the previous week. Furnace coke is quoted at $1.45@$1.60, and foundry at $1.80@$2. The production last week amounted to 217,759 tons, and the shipments to 9,201 cars, distributed as follows: To Pittsburg and river points, 3,263 cars; to points west of Pittsburg, 4,568 cars; to points east of Everson, 1,370 cars.

San Francisco. Oct. 6.

(From Our Special Correspondent.)

There is nothing new to report, except that recent reductions in oil prices are likely to depress the coal market still further. At present, however, prices are unchanged.

For Pacific Coast coals in large lots to dealers, quotations are: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, also in large lots to dealers, prices named are $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside; Colorado anthracite brings $14. For Eastern coal, quotations are largely nominal, supplies being light. Pennsylvania anthracite is $14 and Cumberland $13. For English coal, quotations are exship; Welsh anthracite, $13; Cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade. Oct. 12.

Export trade here continues quiet. A little improvement is reported in shipments to the West Indies and South American ports.

The contract for supplying coal to the United States transports plying to the Philippines, for the year ending June 30, 1905, has been awarded to the Mitsui Busan Kaisha for Miike coal, at $3 per ton, deliveries to be made at Nagasaki, Japan.

The coal production of Germany for the eight months ending August 31 is reported as follows, in metric tons:

	1903.	1904.	Changes.
Coal	75,917,577	79,178,911 I.	3,261,334
Brown coal	28,957,094	30,977,618 I.	2,020,524
Total mined	104,874,671	110,156,529 I.	5,281,858
Coke made	7,512,032	8,076,679 I.	564,647
Briquettes made	6,656,663	7,338,633 I.	681,970

Of the total given above for this year, 74,015,990 tons of coal and 26,236,951 tons of lignite, or brown coal, were from the mines of Prussia.

The official statement of coal production in France for the first half of the year is as follows, in metric tons:

	1903.	1904.	Changes
Coal	16,997,608	16,742,500 D.	255,108
Lignite	335,810	329,311 D.	6,499
Totals	17,333,418	17,071,811 D.	261,607

Of the output this year, 10,759,739 tons were from the Nord and the Pas-de-Calais, and 1,772,086 tons from Loire. No other department produced over a million tons.

The imports of coal at Cartagena, Spain, in 1903 were 64,297 tons, and of coke, 35,140 tons, showing quite an increase as compared with previous years.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of October 1, that the coal market continues dull and unchanged. Quotations are: Best Welsh steam coal, $3.54; seconds, $3.36; thirds, $3.24; dry coals, $3.30; best Monmouthshire, $3.18; seconds, $3.12; best small steam coal, $1.98; seconds, $1.74; other sorts, $1.62.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

There is no change to report in the condition of the outward freight market. Some rates quoted from Cardiff are: Marseilles, $1.20; Genoa, $1.20; Naples, $1.20; Las Palmas, $1.32; St. Vincent, $1.44; Rio, $2.04; Santos, $2.46; Buenos Aires, $1.68.

IRON TRADE REVIEW.

NEW YORK, Oct. 12.

The general tone of the iron market this week is still encouraging. The demand for pig iron seems to be improving, and orders are being placed quite freely. There are some signs on the part of makers of an intention to put prices up again, but buyers naturally do not take kindly to this, and, in most cases, where advances are asked for, they are withholding orders. Furnaces are not inclined, however, to take contracts beyond the first quarter of 1905 at present quotations, and are even holding back on that quarter.

In finished material orders are better, especially in plates and shapes. The placing of a number of orders for steel cars is reported, which will require a large tonnage of plates. In Pittsburg nearly all the mills have started up, and apparently have plenty of orders to keep them going. The railroads, however, are still holding back on rails, and the tonnage of that product for 1904 will probably be the lightest reported for a number of years.

Very little is heard now of export trade. Concerns, which have been doing business of this kind, are apparently disposed to keep it as quiet as possible, for reasons which will be readily understood.

While there is still a little uncertainty as to the future, confidence seems to be increasing, and there is a general anticipation of good business through the winter.

Birmingham. Oct. 10.

(From Our Special Correspondent.)

The change for the better in the iron market in Alabama came on with a rush during the past week, and inquiries have been so steady, with demand fairly good, that some of the larger manufacturers have withdrawn from the market altogether. Quotations took on an advance early in the past week and indications point to a still better price before the end of the month. The production has been increased by the blowing in of one furnace. Preparations are being made for the resumption of work at another furnace and by November two furnaces now being repaired will be ready for the torch. The Tennessee Coal, Iron & Railroad Co. last week blew in No. 3 furnace in the Bessemer group. Two other furnaces at Bessemer are almost in shape, one completed, and will be making iron before the end of this week.

Quotations are very strong, even at the 50c. advance, No. 2 foundry now being quoted at $10. Some of the larger companies in this district wired their sales agents not to sell iron without advising with the general offices in this city. The intention to accumulate iron rather than to sell at prices not so profitable will be carried out, it is stated. At a recent meeting of the Southern Iron Committee, composed of railroads handling the product of the southern furnaces, mills and foundries, no change was made in the rates to the North or West, but southwestern rates were discussed and rearranged.

The following quotations are given for pig iron: No. 1 foundry, $10@$10.50; No. 2 foundry, $9.50@$10; No. 3 foundry, $9.50; No. 4 foundry, $9; gray forge, $8.50@$8.75; No. 1 soft, $10.50; No. 2 soft, $10. Some nice sales have been made at the new prices already, one of the smaller companies in this district on Monday booking an order for two carloads at the $10 rate for No. 2 foundry, this causing public announcement of the advance.

The Republic Iron & Steel Co. has started up the Birmingham rolling mills, members of the Amalgamated Association of Iron, Steel & Tin Workers being given employment. The old puddling department, the 12-in. and 16-in. bar mills go on double turn, with the 8-in. bar mill starting up on single turn. About 700 men are given employment. The greater portion of the coal used in the plant, if not all of it, is purchased by the Republic Co., its union miners being out on strike still. The company has two of the three furnaces at Thomas in operation also. The belief is expressed that the Republic will shortly make preparations looking to a resumption of work at the Gate City mills, near the city. The Tennessee Coal, Iron & Railroad Co. is operating three departments yet in the Bessemer rolling mills, but is not taking on Amalgamated Association members, non-union men being employed.

Chicago. Oct. 10.

(From Our Special Correspondent.)

The market for pig iron continues firm, with no important change in general features. Sales for the last week have been somewhat smaller, in total volume, than for the previous week, but averaged well with preceding weeks. Both northern and southern are in demand for the second quarter of 1905, but agents continue to be reluctant to make contracts so far ahead, except on payment of an advance on present market prices of 50c. to $1. The selling, therefore, is largely on contracts for delivery by January 1 and in the first quarter of the coming year.

It is apparent that little apprehension is felt by the trade of changes due to the presidential election. The general confidence of both buyers and sellers of iron in the stability of business, no matter which side wins, is expressed almost daily. As a turning point of trade, however imaginary, the first of the year continues to be an important date, in the regard of those having to do with pig iron.

Confidence is not yet unqualified or universal in the future stability of the market. Though most dealers in pig iron are optimistic, experience has shown that it is well to proceed cautiously, and this lesson is fresh in the minds of the trade. Attempts are being constantly made to make and maintain higher prices for the local market, and in the case of some furnaces 50c. to 75c. more is being obtained steadily than was secured a month ago. The needs of the buyer as well as the seller, however, continue to control the market, regardless of artificial conditions, and doubtless will continue to control it.

Coke is unchanged as to price—$4.65 for 72-hour Connellsville—and is in good demand. There is no surplus on track, and shipments seem to be so well regulated that there is no apparent danger of a surplus.

Cleveland. Oct. 1.

(From Our Special Correspondent.)

Iron Ore.—The improved tone in the pig iron trade brought out better buying of iron ore during the past week. One or two lots, amounting to 100,000 tons, have been bought, and the market is strong. The better buying anticipates a heavier movement down the lakes, and a consequent increase in rates of carriage. This,

however, is not warranted, since the shipments have been so much in excess of sales that new purchases can be supplied out of surplus. The prices are $3.25 for bessemer old range; $3 for bessemer Mesaba; $2.65 for non-bessemer old range, and $2.50 for non-bessemer Mesabi.

Pig Iron.—There was a spurt in buying of foundry iron during the latter part of the week, which carried prices up to $12.25@$12.50 in the valleys. Hardly any furnaces are still so situated that they are willing to take less than $12.25 for any material, while $12 is now the absolute minimum. Buyers are trying to cover for the first and second quarters of next year, but have been unable to do so because the furnaces are not disposed to trade at present prices, asking $12.50 for first quarter, and $13 for second quarter. There has also been a rush of buying in basic. In all, upwards of 10,000 tons have been covered within the past week, and more orders are piling in, until the movement is on a strong upward swing, with prices steadily advancing. The market has not been stronger for weeks. There is not a movement on in bessemer. The market is so strong that the association is understood to have sold liberal qualities at $12.25 in the valleys.

Finished Material.—The market has been much improved. In some quarters that feverish buying, which has been noted in pig iron, attacked the steel trade. The buying of bar iron, for instance, was ever so much tronger and the price advanced $1 a ton. It is said now that 1.30c. Youngstown is the minimum, with the market looking up. Buying is good in sheets also, and the mills are running full. Prices are steady, but strong. The old quotations hold.

There has been good buying in structural, and it is said now that orders are coming in faster than the material is being shipped. The plate trade has taken much of the same activity, although it is understood that many of the big buyers have not yet covered their needs. It is also reported that there is good buying in billets, and the market in that respect is stronger than it has been for some time. Prices are all steady.

Philadelphia. Oct. 11.

(From Our Special Correspondent.)

Pig Iron.—The chief feature of the pig iron market this week is the number of inquiries from the smaller buyers, mostly foundry men. Another interesting point is offers from large consumers of basic, bessemer and forge iron, for delivery after January 1. This latter phase is a surprise to this market. The actual sale of pig iron is rather light. But our brokers and agents feel much encouraged with the stir that is made, among both large and small buyers, for early and late delivery. Nearly all the iron that is selling day by day is for delivery before December 1. We cannot trace up any important business done for delivery after the holidays, but there is something going on in that direction. Makers are quite willing to accept business, but want an advance at least of 25c. per ton. Several slight advances have already been made, and the tone of the market is decidedly stronger. Quotations may be given, approximately, at $15.25 for No. 1X; special irons have their own price. Some business has been done in No. 2X at $14.50; low phosphorus cannot be had at less than $18; for basic $13 is quoted to-day; standard gray forge $13 for best brands.

Billets.—A large business is promised in billets, and prices are hanging around $22; the inquiries have hardened the market. Large buyers still believe there will be a cut.

Bars.—Bar iron makers report a dragging demand. The position is as two weeks ago, notwithstanding the reduction in price. The larger iron makers talk more hopefully and have within two or three days answered a good many letters concerning early winter deliveries.

Sheets.—For a week or two past sheets have been dragging. To-day mill orders showed up better, and the distribution from stores shows a marked improvement.

Pipes and Tubes.—The pipe demand is dull, which is accounted for by the fact that late summer buying anticipated October requirements. Boiler tubes are more active, but in a very small way. Quotations firm.

Merchant Steel.—The consumption of merchant steel in eastern territory is now beginning to pick up, as nearly all the small shops and plants using merchant steel are busier than they have been. Prices are weak in large lots and firm in small lots.

Plates.—The plate market has not improved in a large way, but the small trade, ranging in lots from 25 to 100 tons, is quite satisfactory. Boiler and tank iron is mostly wanted. Quotations on plates 1.48½, for bridge and boat under 24-in.; marine steel is quoted at 1.79½; locomotive steel, 2.08½c.

Structural Material.—A rumor has gained some acceptance in this market that the American Bridge Co. has arranged with certain railroad companies for bridge construction, but where or how much bridge material can be wanted cannot be ascertained. The consumption of structural material in our territory is quite satisfactory to the manufacturers. Quotations, 1.53½@1.65; small angles are selling at 1.50c.

Old Iron Rails.—Old iron rails are wanted by three or four buyers who are in the market, but the asking price of $16 is about $1 above their views.

Scrap Iron.—There is quite a stir for scrap; the kind that is wanted is scarce. The asking prices for No. 1 steel and for railroad and machinery scrap have been marked up 50c. The other kinds stand about the same.

New York. Oct. 5.

Pig Iron.—Buying has improved decidedly; orders come from local territory and from New England. For northern iron we quote: No. 1X foundry, $14.75@$15; No. 2X, $14.25@$14.50; forge, $13@$13.25. For southern iron on dock prices are about as follows: No. 1 foundry, $13.50; No. 2, $13@$13.25; No. 3, $12.75@$13.

Bar Iron.—We quote refined iron bars at 1.445@1.495c.

Plate.—Small orders and none too many of these is the prevailing feature of the market. We quote 1.545c. for ¼-in. tank plate in carloads at tidewater, with other grades in proportion.

Steel Rails.—Quotations are still $28 for standard sections, f. o. b. mills in lots of over 500 tons. Quotations for light rails by the chief producing concern range from $18.50 for 40-lb. up to $22 for 12-lb., f. o. b. mills in large lots. Central Pennsylvania mills ask $21 for 40-lb. and $24 for 16-lb.

Structural Material.—The demand shows little change. We quote on large lots at tidewater, 1.55@1.80c. for beams, angles and channels.

Pittsburg. Oct. 11.

(From Our Special Correspondent.)

While the buying of pig iron during the week was not as heavy as the previous week, there is a much firmer tone, and prices are a trifle higher. One sale of 1,000 tons of bessemer pig iron was recorded yesterday, the price being $12.15, Valley furnace, or $13, Pittsburg, which is an advance of 15c. a ton over the highest price paid in several months. Other sales of smaller lots were made at $12, Valley. A number of sales of foundry and gray forge were made at better prices than have prevailed. There are a number of inquiries for all grades of pig iron for deliveries extending into the first quarter of next year, but furnaces so far have refused to quote present prices for shipment beyond January 1. The monthly report of J. G. Butler, Jr., chairman of the Bessemer Pig Iron Association, has just been issued. The smallest idle capacity in the year, excepting only the months of April and May, when there was a spurt in production, is reported for October 1. Out of 192 stacks using Lake Superior ore and reporting to the association, 129 were in, and 63 out of blast. The daily capacity of the entire 192 stacks is 55,300 tons. The active capacity is 41,174 tons, and the idle capacity 14,126 tons, showing the idle capacity on October 1 to be 26%, a decrease of 2% since September 1. The idle capacity from the beginning of the year follows: January, 64.5%; February, 38%; March, 28%; April, 14.5%; May, 10.5%; June, 30%; July, 35%; August, 41%; September, 28%; October 1, 26%. The resumption of furnace operations is probably the best indication of improvement throughout the iron and steel industry, and the increase in operations, which began in the latter part of August, is shown to have been steadily maintained throughout September. The outlook is for a still further decrease in the number of idle furnaces during the present month.

The satisfactory movement in pig iron has been followed by increased business in finished products. The heaviest demand is for plates and shapes. This was shown by the starting on Sunday night at the Homestead works of the Carnegie Steel Co. of the bessemer department and the 28, 33, 38 and 84-in. plate mills, and puts the entire plant in full operation on double turn. Employment was given to over 1,000 additional men, and indications point to steady work for fully 5,000 men for several months. It is the policy of this company not to make public the orders it receives, and the increase in business is only known through the operation of its plants. The Pressed Steel Car Co. has a long term contract with the Carnegie company for plates, and it was admitted by a representative of the company that a large number of orders have just been received for steel cars and that the works will be run to their fullest capacity for some time. For some reason, however, the company refuses information as to the number of cars for which it has just closed contracts. It is learned that railroads had not expected the unusually heavy freight tonnage now being offered, owing to this being a Presidential year, and are now placing rush orders for cars to take care of the business. The Monongahela works of the American Sheet & Tin-Plate Co., on the South Side, were put in full operation after an idleness of several months. The Bray semi-continuous process for making tin-plate has been installed at this plant. The tin-plate trade shows considerable improvement, and the leading interest continues to quote $3.25 a box net for 100-lb. cokes in large lots. Independents are said to be cutting this price, and all seem to be getting a fair share of the business that is going. The plant of the Pope Tin-Plate Co., at Steubenville, O., which has been idle for some time, was put in operation during the week. The Riter-Conley Manufacturing Co. has just closed a contract for a tank for the Milwaukee Gas Co. that will require 3,500 tons of plates and shapes. The company has also received several smaller orders during the week that will require an equal tonnage of plates and shapes. It is also a bidder on a contract for the largest tank in the world, to be erected in England, which will take 15,000 tons. It is not certain that this big contract will come to Pittsburg.

Despite the efforts being made by the officers of the Amalgamated Association of Iron, Steel & Tin Workers and the Ohio State board of arbitration to obtain another conference with the Carnegie Steel Co., to adjust the trouble at the hoop plants in the Youngstown district, it is positively announced that none will be held. The company now has the three plants in partial operation and will not re-open negotiations. While the company refuses to recognize the Amalgamated Association, it is willing to employ its members, and the wages offered in the puddling mills are a trifle higher than in the association scale. The wage differences at the sheet plant of the Inland Steel Co., at Indiana Harbor, were not adjusted last week, at the conference with President T. J. Shaffer, of the Amalgamated Association. The company is in no hurry to start, but agrees to put the sheet plant in operation if the workers will accept the wage scale in force at the Vandergrift plant of the American Sheet & Tin-Plate Company.

Pig Iron.—The sales of bessemer pig iron during the week aggregate about 4,000 tons. One lot of 1,000 tons sold at $12.15, Valley furnaces, and smaller lots sold at $12. Sales of foundry and forge iron amount to probably 5,000 tons. Prices are higher this week, and quotations are as follows: Bessemer, $12@$12.15, Valley; foundry No. 2, $12.85@$13, Pittsburg; gray forge, $12, Pittsburg.

Steel.—Several small sales of bessemer billets were made during the week at the pool price of $19.50, Pittsburg, and that rate is firmly

maintained. There are no grounds for reports of cutting in billet prices. Sheet bars are firm at $21.50. Steel bars range from 1.30 to 1.35c., and plates from 1.30 to 1.40c.

Sheets.—The sheet market is fairly good, and the outlook for the rest of the year is regarded as very encouraging. Prices are firm, and No. 28 gauge black sheets are quoted at 2.10c., and galvanized at 3.10@3.15c.

Ferro-manganese.—There is no change in prices, 80% domestic still being quoted at $41.50, although it is reported that a sale was made at $41 per ton.

Cartagena, Spain. Sept. 24.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—Shipments for the week were one cargo (1,450 tons) dry ore to Glasgow. Reports indicate somewhat increasing inquiries both for dry and manganiferous ores to buyers offering lower prices, while freights are decidedly higher. Tonnage is very scarce, and recent charters have been from 6s. 4d. to 6s. 6d. to United Kingdom ports and 7s. to Rotterdam. The new bill, which came into force at the beginning of the month, prohibiting Sunday labor, is meeting with great opposition, especially in those districts where the principal transport is by carts and donkeys. It is referred to here as an increase of 16 per cent in the price of transport, which is already higher than the mineral will stand. It is hoped that it will receive some modifications.

Quotations for iron ores are as follows, per ton, f. o. b. Cartagena: Ordinary 50% ore, 6s.@6s. 3d.; special low phosphorus 6s. 6d.@7s. 3d.; specular ore, 58%, 8s. 6d.; magnetic ore, 60%, 10s. 9d. for lumps, and 9s. for smalls. For manganiferous ores, quotations vary from 9s. 3d. for 35% iron and 12% manganese, up to 14s. for 20% iron and 20% manganese.

Pyrite.—Iron pyrite, 40% iron and 43% sulphur, is quoted at 10s. per ton, f. o. b. Cartagena. Business is practically dead for the present.

Other Shipments.—Other shipments for the week include 19,000 kg. ocher to Swansea.

CHEMICALS AND MINERALS.

New York, Oct. 12.

Trade conditions are seasonably good, and sellers generally ask higher prices for forward deliveries. There are, however, several weak spots in so-called combination products which may have some influence on future profits. The German Kali Syndicate, in line with its policy to control the market, contemplates a reduction in the price of kainit, and may make other changes. The barytes industry is having the unique experience of witnessing keen competition between independent producers and those in combination, partly explained by a wider distribution of workable deposits and the investment of new capital. There is, however, an increasing demand for the better grades of barytes, at satisfactory prices to the producer, but the poorer quality, being in oversupply, must be sold at a sacrifice. In the salt trade the interesting item is the sale of the assets of the United Salt Co., at Cleveland, O., for $105,000, which is a little less than one-third the price obtained for the National Salt Co., with which the United had costly litigation over contracts. On October 1 the American Cement Co. cancelled $35,000 of its bonds, leaving $825,000 of the $1,000,000 issued still to be redeemed. Final arrangements are being made to incorporate the Popocatapetl Co. at $5,000,000 to work the sulphur deposit in the extinct volcano in Mexico, for which $300,000 gold and 200,000 shares of stock was recently paid to the owners.

Brimstone is steady in price. Nitrate of soda has again advanced as a result of the report from the west coast that the exports in the fiscal year ending March 31 next will total only 34,500,000 qtl., instead of 36,000,000 qtl., as agreed to by the combination. Production, on the other hand, is 750,000 qtl. less than it was up to October 1, 1903, indicating that the strike at Tocopilla has had some effect. The tendency of prices is upward, and importers at New York hold for $2.275 per 100 lb. for 95%, and $2.30 for 96% for any position to June, 1905. These are record high prices, and compare with those ruling for a short time during the Spanish-American war, when a certain New York clique tried to corner the market. Ocean freights from the west coast are firmer, as a number of vessels have left in ballast. There is no doubt that the combination among the shipowners is partly responsible for the firm attitude in the freight market.

Messrs. Mortimer & Wisner's monthly statement of nitrate of soda, dated New York, Oct. 1, gives the following interesting statistics, in long tons:

	1904.	1903.
Imported into Atlantic ports from West Coast S. A. from Jan. 1, 1904, to date	180,664	173,880
Stock in store and afloat Oct. 1, 1904,		
New York	500	4,000
Boston	1,000	1,000
Baltimore	100	4,000
Charleston		2,200
To arrive, due Jan. 15, 1905	90,700	68,200
Visible supply to Jan. 15, 1905	92,300	79,400
Stock on hand Jan. 1,	8,100	7,800
Deliveries past month	17,600	27,379
Deliveries since Jan. 1 to date	187,164	170,480
Total yearly deliveries		229,589
Prices current, Oct. 1	2.25c.	2.10c.

Quotations are for 96%; 95% can be had at 2½c. to 5c. per 100 lb. cheaper. The deliveries so far this year have established a new high record.

Quotations for wholesale quantities are as below, f. o. b. New York, unless otherwise specified:

Brimstone, Domestic 2ds, long ton	$21.20
Domestic 99.5% long ton (For Baltimore and Phila. add 25c.; Portland, 15c.)	21.50
Foreign 2ds, long ton	21.50
Foreign 3ds, long ton	20.875
Pyrite, Am. 42@44%, lump, unit, at shipping port	10@10½c.
Am., fines, unit, at shipping port	8½@9c.
Spanish, 46@52%, lump, unit	10@11½c.
Spanish, fines, unit	9@10c.
Nitrate of soda, 95%, 100 lb	2.275
96%, 100 lb	2.30
Sulphate of ammonia, gas liquor, 100 lb	3.025@3.10
Phosphate, Fla. rock, 77@80%, f.o.b. shipping port	7.25@7.50
Fla. rock, 77%80%, c.i.f. Europe	10.53@11.70
Fla. land pebble, 68@73%, f.o.b. shipping port	3.75@4.00
Fla. land pebble, 68@73%, c.i.f. Europe	7.70@8.40
Tenn., 78@80%, f.o.b. Mt. Pleasant	4.00@4.25
Tenn., c.i.f. Europe	10.27@10.67
Tenn., 78%, f.o.b. Mt. Pleasant	3.75@4.00
Tenn., 75%, f.o.b. Mt. Pleasant	3.25@3.50
So. Car. land rock, f.o.b. Ashley River	3.25@3.50
So. Car. river rock, f.o.b. Ashley River	3.00@3.25
So. Car. river rock, c.i.f. Europe	6.33@6.56
Algerian, 63@70%, c.i.f. Europe	6.93@7.59
Algerian, 58@63%, c.i.f. Europe	6.15@6.60
Algerian, 53@58%, c.i.f. Europe	5.05@5.20
Tunis, c.i.f. Europe	6.33@6.50
Christmas isle, 80@85%, c.i.f. Europe	12.87@14.11
Ocean isle, 82@88%, c.i.f. Europe	13.60@14.45
Bleaching powder, prime, 100 lb	1.15@1.25
Cyanide, lb	18@19c
Copper sulphate, 100 lb	4.75@5.00
Nitric acid, 36°, 100 lb	4.75
38°, 100 lb	4.75
40°, 100 lb	5.00
42°, 100 lb	5.50
Oxalic acid, com'l, 100 lb	5.10@ 5.50
Sulphuric acid, 50°, bulk, ton	13.50@14.50
60°, 100 lb	1.05
60°, bulk, ton	18.00@20.00
66°, 100 lb	1.20
66°, bulk, ton	21.00@23.00

Other products are quoted monthly in the "Wholesale Price Current," which will appear October 20.

Liverpool. Sept. 28.

(*Special Report of Joseph P. Brunner & Co.*)

There is a firm market for heavy chemicals generally, while for fertilizers higher prices are now quoted.

Soda ash is in fair request. For tierces, the nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net, cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. per ton, net, cash. Bags, 5s. per ton under price for tierces. Soda crystals are in request at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is in fair demand, and prices are steady, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net, cash; special quotations for the Continent and a few other export quarters.

Bleaching powder is firm, at £4 15s.@£5 per ton, net, cash, for hardwood packages, as to market.

Chlorate of potash is steady, at 3@3¼d. per lb., net, cash, for English make, as to quantity and market.

Bicarbonate of soda is without change, at £6 15s. per ton, less 2½%, for the finest quality, in 1-cwt. kegs, with usual allowances for larger packages, also special quotations for a few favored markets.

Sulphate of ammonia has hardened, sellers now quoting £12 5s.@£12 10s. per ton, less 2½%, for good gray 24@25% in double bags, f. o. b. here, as to quality.

Nitrate of soda is only in moderate demand on spot, but taking advantage of the reports of labor troubles on the west coast, holders have put up prices to £10 10s.@£10 15s. per ton, less 2½% for double bags, f. o. b. here, as to quantity and quality.

METAL MARKET.

New York, Oct. 12.

Gold and Silver Exports and Imports.

At all United States Ports in August and Year.

Metal.	August.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports	$84,776	$10,762,818	$40,538,775	$80,295,460
Imports	7,848,553	7,761,371	26,455,814	64,450,515
Excess	E. $7,763,777	E. $3,001,447	E. 14,082,961	E$15,844,945
Silver:				
Exports	2,019,655	4,848,932	22,540,420	35,751,145
Imports	2,368,519	2,513,550	14,914,030	17,670,167
Excess	I. $348,864	E. $2,335,382	E. $7,626,390	E$18,080,978

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending October 8 and for years from January 1st.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$16,400	$99,982	$464,591	$28,885
1904	73,177,464	4,228,549	29,775,974	756,774
1903	31,423,005	6,561,429	22,976,416	2,972,185
1902	24,522,118	3,193,851	20,384,494	939,199

The gold movement was chiefly with Central and South America and the West Indies; of silver, principally with London.

General business seems to be gradually improving, as election time approaches. Foreign exchange continues low, but no step has been taken toward importing gold.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending October 8, gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$913,101,500	$1,145,989,200
Deposits	897,615,100	1,205,276,000
Circulation	45,714,800	41,791,000
Specie	171,063,700	237,503,500
Legal tenders	69,917,200	76,452,400
Total reserve	$240,980,900	$313,955,900
Legal requirements	224,403,775	301,319,000
Balance surplus	$16,577,125	$12,636,900

Changes for the week were increases of $2,955,300 in loans and discounts, and $1,215,000 in circulation; decreases of $7,521,100 in deposits, $6,863,600 in specie, $2,293,200 in legal tenders, and $7,276,525 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The

amounts are reduced to dollars, and comparison is made with the holdings at the corresponding date last year:

	1903. Gold.	1903. Silver.	1904. Gold.	1904. Silver.
N. Y. Ass'n.	$171,063,700	.....	$237,503,500	.....
England	165,550,970	.....	189,519,610	.....
France	498,987,460	$222,643,995	524,651,s80	$221,268,045
Germany	157,455,000	55,320,000	146,740,000	51,560,000
Spain	73,120,000	98,215,000	74,015,000	102,260,000
Netherlands	19,753,500	31,938,500	27,398,000	30,685,500
Belgium	14,920,000	7,460,000	16,053,335	8,026,665
Italy	99,660,000	11,926,000	109,990,000	16,651,500
Russia	402,075,000	36,900,000	483,205,000	38,585,000
Austria	228,940,000	62,400,000	241,305,000	61,060,000

The returns of the Associated Banks of New York are of date October 8, and the others October 6, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has continued fairly steady, with a rise to 26 11-16d. on account of small supply offering in London. The market closed flat, at 26 9-16d., as the India market did not respond to the rise in London.

The United States Assay Office in New York reports receipts of 50,000 oz. of silver for the week.

Shipments of silver from London to the East for the year up to September 29 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£4,475,975	£7,606,998 I.	£3,131,023
China	294,186	372,722 I.	78,536
Straits	721,879	58,103 D.	663,776
Total	£5,442,040	£8,037,823 I.	£2,545,783

Receipts for the week were £138,000 in bar silver from New York, and £2,000 from Chile; total, £140,000. Shipments were £68,000 in bar silver to Bombay, and £35,000 to Calcutta; total, £101,500.

India exchange has been steady, all the Council bills offered in London having been taken at 16d. per rupee. The buying of silver for India account has been moderate, but it is still believed that some purchases will be made for coinage shortly.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.46	$0.47½
Peruvian soles and Chilean pesos	.42	.43½
Victoria sovereigns	4.85	4.87
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. Cathodes, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. Per lb.	Spelter. St. Louis, Cts. per lb.
6	12¾ @13	12⅝ @12⅞	12⅝ @12⅞	58½	28½	4.20	5.05 @5.10	4.90 @4.95
7	12¾ " 13	12⅝ " 12⅞	12⅝ " 12⅞	59½	28½	4.20	5.05 " 5.10	4.90 "4.95
8	12¾ " 13	12⅝ " 12⅞	12⅝ " 12⅞	....	28½	4.20	5.05 " 5.10	4.90 "4.95
10	12⅞ " 13	12⅝ " 12⅞	12½ " 12⅝	59½	28⅝	4.20	5 07½ " 5.10	4.92½ "4.95
11	12⅞ " 13	12⅝ " 12⅞	12½ " 12⅝	59½	28½	4.20	5.07½ " 5.10	4.92½ "4.95
12	13 " 13½	12⅞ " 13	12⅝ " 12⅞	60	@28¾	4.20	" 5 10 " 5.15	4.95 "5.00

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

SILVER AND STERLING EXCHANGE.

October.	Sterling Exchange.	Silver. New York. Cents.	Silver. London, Pence.	October	Sterling Exchange.	Silver. New York. Cents.	Silver. London, Pence.
6	4.85½	57⅜	26⅝	0	4.85½	57½	26¼
7	4.85½	57½	26⅝	11	4.85½	57½	26 11/16
8	4.85½	57½	26⅝	2	4.85½	57½	26 11/16

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver .925 fine.

Copper continues strong and advancing, consumers both here and abroad buying freely for prompt as well as future delivery. We understand that large orders have also been placed for shipment to the Far East, no doubt due to the falling off in the Japanese production caused by the war. The closing quotations are given as 13@13⅛c. for Lake copper; 12⅞@13c. for electrolytic in ingots, cakes and wirebars; 12⅝@12¾c. for cathodes; 12½@12⅝c. for casting copper.

The market for standard copper in London, which closed last week at £59 10s., opened on Monday at £59 12s. 6d., and the closing quotations on Wednesday are cabled as £59 18s. 9d.@£60 for spot, £60@£60 1s. 3d. for three months.

Refined and manufactured sorts we quote: English tough, £62@£62 5s.; best selected, £63@£63 5s.; strong sheets, £71 10s.@£72; India sheets, £69 10s.@£70; yellow metal, 5¼@5⅜d.

Exports of copper from New York and Baltimore for the week ending October 11 were 3,436 long tons. Imports for the week were 715 tons at Baltimore, and for last week 61 tons at New York.

Tin has ruled quiet but firm throughout the week, without any special feature. The closing quotations are given as 28¼@28⅜ for spot and futures.

The foreign market, which closed last week at £129 5s., opened on Monday at £129 7s. 6d., declined on Tuesday to £129, and the closing quotations on Wednesday are cabled as £129 7s. 6d.@£129 10s. for spot, £129@£129 2s. 6d. for three months.

Spot tin appears to be rather scarce.

Lead is quiet but firm, but nothing of interest has transpired. There is a good consumptive demand. The closing quotations are 4.20 New York, 4.12½ St. Louis.

The foreign market continues very strong, Spanish lead being quoted at £12 2s. 6d.; English lead, £12 5s.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is quiet, but very firm. De-silverized lead is selling at 4.12½c., with a fairly active demand. Missouri metal brings 4.12½@4.15c., according to brand.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of September 24, that the price of silver has been 14.50 reales per oz. Exchange is 34.77 pesetas to £1. Local quotation for pig lead has been 66.75 reales per quintal, which, on current exchange, is equal to £10 14s. 11d. per long ton, f. o. b. Cartagena. There were no exports of pig lead this week.

Spelter.—There has been a decline in the price of ore, but, on the other hand, quite a good consumptive demand has sprung up and an active business developed. The closing quotations are 4.95@5c. St. Louis, 5.10@5.15c. New York.

The foreign market is strong, good ordinaries being quoted at £22 15s., specials at £23.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is very quiet, but steady. The nominal value is 5c., East St. Louis, although it is reported that this price is being shaded by some sellers.

Silesian Spelter Market.—Herr Paul Speier writes from Breslau, under date of September 27, that the very strong tendency manifested in August has continued, and during this month the market was very firm and prices high. Quotations have been about 22.50 marks per 50 kg., f. o. b. cars, Breslau, which is equivalent to about 4.83c. per lb. New York. According to the statistics of the Oberschlesischen Berg und Hüttenmannischen Vereins, the production in the second quarter of the year was 30,342 tons, making the output for the half-year 59,934 tons, which is 1,484 tons more than in the first half of 1903. The news that a large quantity of metal had been taken in New York for export to Germany had considerable effect on the market. The price of zinc dust is unchanged, with only a moderate business done.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of September 24, that the market continues good, and ore prices are steady at 67 pesetas per ton for blende, 35% zinc, and 47 pesatas for calamine, 30% zinc. Shipments were 350 tons blende to Swansea and 385 tons to Antwerp.

Antimony is steady, with the demand nothing out of the ordinary. We quote: Cookson's, 6¾@7c.; Hallett's, 6⅜@6⅝c.; U. S., French, Hungarian, Italian, Japanese and Chinese, 5⅞@6c.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

Platinum.—Quotations are higher, at $19.50 per ounce.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

Quicksilver.—Prices are low. In New York large lots have been offered at $40 per flask (75 lb.), with $41@$42 quoted for smaller orders. The San Francisco price is now $41.50 @$42. London price is £7 15s., with the same quotation from second-hands.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

	Per lb.		Per lb.
Aluminum.			
No. 1. 99% ingots	33@37c	Ferro-Chrom. (74%)	12½c.
No. 2. 99% ingots	31@34c	Ferro-Tungsten (37%)	45c.
Rolled Sheets	4c. up	Magnesium, pure	
Alum-bronze	20@23c.	(N.Y.)	$1.60
Nickel-alum	33@39c.	Manganese, (98@99%	
Bismuth	$2.10	N. Y.)	75c.
Chr'm'm, pure (N.Y.)	80c.	Manganese, Cu., (30@70%	
Copper, red oxide	50c.	N. Y.)	40c.
Fe.-Molybd'm (50%)	$1.00	Molybdenum, (98@99%	
Ferro-Titanium (20@25%		N. Y.)	$2.75
N. Y.)	75c.	Phosphorus, foreign	45c.
Ferro-Vanadium, (25%		Phosphorus, American	70c.
N. Y.)	$3.00	Sodium metal	50c.
		Tungsten (best)	$1.25

Differences in price depend chiefly upon size and conditions of order.

Missouri Ore Market. Oct. 8.

(From Our Special Correspondent.)

October is a record maker in this district in at least two points—first in zinc ore reaching the highest price in proportion to the spelter market; and second, in the rapid decline of zinc prices—marking a drop of $5 to $6 per ton in one day. Up to Thursday morning prices were firm and zinc ore was in demand, but when the Edgar Zinc Co. came into the market during the day with offerings of only $40 per ton of 60% zinc, against a price of $47 per ton the previous week, and the M. & H. Zinc Co. kept entirely clear of the market, the purchasing agents of other smelters were tumbling around pretty lively to reduce their prices to suit. The result was that buyers who entered the market and purchased ore early in the week on an assay basis of $46@$47 per ton were paying only $41 per ton for 60% zinc the latter part of the week. Representatives of conservative smelters believe that prices will strengthen, and hold steady around $40@$42 per ton of 60% zinc. Lead continues in brisk demand at $53.50 per ton.

Following are the shipments of zinc and lead from the various camps of the Joplin district for the week:

	Zinc lb.	Lead lb.	Value.
Joplin	2,086,140	399,930	$57,420
Webb City-Carterville	1,849,570	470,330	50,300
Duenweg	630,900	190,850	20,130
Galena-Empire	797,970	114,810	19,800
Aurora	575,440	9,930	11,360
Prosperity	100,720	154,480	6,310
Alba-Neck	262,360	.....	6,300
Granby	381,000	29,000	4,980
Sherwood-Mitchell	207,180	10,710	4,840
Oronogo	172,090	15,450	4,280
Diamond	119,080	.....	2,620
Carthage	101,570	.....	2,440
Spurgeon	131,930	9,870	2,170
Badger	85,750	.....	1,970
Beef Branch	91,520	16,360	1,610
Zincite	47,320	5,800	1,240
Carl Junction	47,440	.....	550
Totals this week,	7,724,690	1,427,520	$199,510
41 weeks	404,368,100	51,578,340	$8,277,790
Zinc value, the week,	$164,030;	41 weeks,	6,879,900
Lead value, the week,	35,480;	41 weeks	1,397,890

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan	28.33	28.845	4.075	4.347	4.865	4.863
Feb	29.43	28.087	4.075	4.375	5.043	4.916
Mar.	30.15	28.317	4.442	4.475	5.349	5.057
April	29.81	28.132	4.567	4.475	5.550	5.219
May	29.51	27.718	4.325	4.423	5.639	5.031
June	28.34	26.325	4.210	4.196	5.697	4.760
July	27.68	26.573	4.075	4.192	5.662	4.873
Aug.	28.29	27.012	4.075	4.111	5.725	4.866
Sept	26.77	27.780	4.243	4.200	5.686	5.046
Oct	25.92	.....	4.375	.....	5.510	.....
Nov.	25.42	.....	4.218	.....	5.038	.....
Dec	27.41	.....	4.162	.....	4.731	.....
Year	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.; June, 4.596c.; July, 4.723c.; August, 4.716c; September, 4.896c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan	12.159	12.410	12.361	12.553	53.52	57.50
Feb	12.778	12.063	12.901	12.245	57.34	56.50
Mar.	14.416	12.299	14.572	12.551	63.85	57.321
April	14.454	12.923	14.642	13.120	61.72	58.247
May	14.435	12.758	14.618	13.000	61.73	57.321
June	13.042	12.269	14.212	12.399	57.30	56.398
July	13.094	12.380	13.341	12.505	56.64	57.256
Aug.	12.962	12.343	13.159	12.468	58.44	56.952
Sept	13.205	12.495	13.345	12.620	56.82	57.645
Oct	12.801	.....	12.954	.....	55.60	.....
Nov.	12,617	.....	12.813	.....	56.30	.....
Dec	11,952	.....	12,084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan	25.62	55.56	21.98	47.57	26.423	57.055
Feb	25.41	55.09	22.11	47.89	26.665	57.592
Mar.	25.00	54.23	22.49	48.72	26.164	56.741
April	24.34	52.72	23.38	50.56	24.974	54.202
May	23.71	51.31	24.89	54.11	25.578	55.430
June	24.17	52.36	24.29	52.86	25.644	55.673
July	24.38	52.88	24.86	53.92	26.760	58.095
Aug.	24.23	52.52	25.63	55.36	26.591	57.806
Sept	23.88	51.52	26.75	58.00	26.349	57.120
Oct	23.40	50.57	27.89	60.36	.....	.....
Nov.	22.70	49.07	27.01	58.11	.....	.....
Dec	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company.	Payable.	Rate.	Amount.
†Am. Sm. & Ref., com.	Oct. 25	$1.25	$625,000
†Central C. & C., com.	Oct. 15	1.50	76,875
†Central C. & C., pf.	Oct. 15	1.25	23,437
*Claremont Oil, Cal.	Oct. 1	.01	4,500
†Continental Zinc	Oct. 1	.40	8,800
*Daly-West, Utah.	Oct. 15	.40	72,000
Isperanza Oil.	Oct. 8	.01	1,250
Greene Con. Copper.	Oct. 28	.30	259,200
Iron Silver, Colo.	Oct. 31	.10	50,000
*Natividad, Mex	Oct. 15	5.00	12,000
N. S. St. & C., com.	Nov. 1	3.00	150,000
N. S. St. & C., pf.	Nov. 1	2.00	20,600
N. Y. & Hond. R.	Oct. 22	.10	15,000
*Oil City Petroleum	Oct. 1	.01	2,500
‡Pa. Salt.	Oct. 15	3.00	180,000
*Peerless Oil, Cal.	Oct. 1	.14	12,880
†Phila. Nat. Gas., com.	Nov. 1	.75	398,888
†Pittsburg Coal, pf	Oct. 25	1.75	519,771
*Twenty-eight Oil.	Oct. 1	.20	12,000
†Va. Car Chem., pf	Oct. 15	2.00	360,000
*West Shore Oil.	Oct. 1	.05	5,000

*Monthly. †Quarterly. ‡Semi-annually.

ASSESSMENTS.

Company.	Delinq.	Sale.	Amt.
Alpha Con., Nev.	Oct. 3	Oct. 24	.05
Beaver Harrison,	Sept. 26	Oct. 20	.02
Brunswick Con.	Nov. 3	.....	.03
California, Utah	Oct. 12	Nov. 26	.06
Con. Cal. & Va.	Oct. 31	Nov. 21	.25
Con. St. Gothard	Oct. 15	.....	.05
Elsie, Utah	Oct. 12	Oct. 29	.00½
Excelsior, Utah	Sept. 26	Oct. 17	.25
Hale & Norcross	Oct. 31	Nov. 30	.10
Hannapah, Nev	Oct. 11	Oct. 27	.00½
Joe Bowers, Utah	Sept. 24	Oct. 15	.10
Las Goteras, Mex.	Oct. 29	.....	.03
Marina Marsicano	Sept. 29	Oct. 31	.05
N. Y. Bonanza,	Oct. 18	Nov. 7	.03
Orleans Con., Cal.	Sept. 15	Oct. 31	.07
Savage Nev	Oct. 5	Oct. 26	.10
South Eureka, Cal.	Oct. 29	.....	.02
Solden, Cal	Nov. 2	.....	.10
Trade Dollar, Utah	Oct. 18	Nov. 9	.10
Tule Belle, Cal.	Nov. 1	.....	.02
Wabash, Utah	Sept. 23	Oct. 15	.05
White Pine, Nev.	Oct. 21	.....	.20
Ybarra, L. Cal.	Oct. 29	.....	.05
Yellow Jacket, Nev.	Sept. 22	Oct. 27	.10

NEW YORK.

Company.	Par. val.	Oct. 5 H.	Oct. 5 L.	Oct. 6 H.	Oct. 6 L.	Oct. 7 H.	Oct. 7 L.	Oct. 8 H.	Oct. 8 L.	Oct. 10 H.	Oct. 10 L.	Oct. 11 H.	Oct. 11 L.	Sales.
Acacia	1	.06	...	...	...	...	...	...	...	...	...	...	...	500
Amalgamated. C.	100	61½	59½	61½	61¾	62½	61	62½	62	63¼	62½	63½	63¼	307,860
Anaconda	25	97	95	99½	97	99½	98¼	100½	99¼	102	100	102	100	10,349
Anaconda G.	5	...	...	...	...	...	.09	...	...	...	...	...	...	1,000
Andes	1	...	...	.33	.32	...	...	...	...	...	...	...	...	500
Best & Belcher.	3	...	...	...	...	1.30	...	...	...	...	...	...	...	300
Brunswick	5	...	...	...	...	.06	...	...	...	...	...	...	...	5,000
Caledonia	1	.63	...	...	...	.58	...	...	...	.60	...	...	...	300
Challenge	1	...	...	.25	...	...	.22	...	...	...	...	...	...	300
Chollar	2½	.23	...	...	...	.22	...	...	...	...	...	.24	...	1,200
C. K. & N	1	.22	...	...	...	...	...	...	...	...	...	...	...	500
Confidence	3	...	...	...	...	...	...	1.00	...	...	...	...	...	300
Con. Cal. & Va.	2½	...	...	...	...	...	...	...	...	1.90	...	1.90	...	300
Creede & C. Ck.	1	...	...	...	...	.03	...	...	...	...	...	...	...	2,000
Cripple Creek Con.	1	...	...	...	...	...	...	...	...	.09	...	...	...	500
Crown Point	1	.16	...	...	...	...	...	...	...	...	...	...	...	300
Dunkin	1	...	...	...	...	...	...	...	...	.09	.08	...	...	400
Elkton Con	1	...	...	...	...	...	...	.63	.62	.62	...	.62	...	700
El Paso	1	...	...	1.05	...	...	...	...	...	...	...	...	...	1,000
Gold Dollar	1	...	...	...	...	...	...	...	...	...	...	.06	...	1,000
Gould & Curry	1	...	...	.32	.28	...	...	.25	...	...	...	.26	...	1,600
Greene Con.	10	.20	19½	20½	19½	20½	19½	20½	20½	20½	20½	21	20½	87,053
Hale & Norcross.	3	.64	.63	.68	...	.65	...	...	...	...	...	.65	...	900
Homestake	100	...	...	55	...	...	...	...	...	...	...	...	...	50
Horn Silver	20	...	...	...	...	1.75	...	...	...	1.65	...	...	...	150
Isabella	1	...	...	.20	...	.21	...	...	...	.21	...	...	...	1,800
Julia	1	...	...	...	...	.09	.08	...	...	...	...	...	...	1,000
Justice	2	...	...	.13	...	...	...	...	...	...	...	...	...	500
Little Chief	50	...	...	...	...	...	...	...	...	.07	...	...	...	200
Mexican	3	1.55	...	...	...	...	...	...	...	...	...	...	...	300
Moon Anchor	5	...	...	.08	...	...	...	...	...	...	...	.06	...	1,500
Ontario	100	3.70	...	...	...	3.75	...	4.00	...	...	...	4.00	...	160
Ophir	3	2.65	...	...	...	2.65	...	2.70	...	2.70	...	2.60	...	500
Overman	1	...	...	...	...	...	...	...	...	20	...	...	...	200
Pharmacist	1	...	...	...	...	...	...	...	...	.04	...	...	...	500
Phœnix	1	.20	.15	.21	.18	.22	.19	.21	.20	.24	.20	.25	.19	47,900
Potosi	1	.32	.18	.18	...	...	...	...	...	.17	...	...	...	1,500
Rose Maud	1	.05	...	...	...	...	...	...	...	...	...	...	...	1,000
Savage	3	...	...	...	...	.36	...	.36	...	...	...	...	...	400
Silver Hill	1	...	...	...	...	...	...	.55	...	...	...	...	...	300
Tennessee C	10	33	32½	32½	...	32½	...	...	...	33	32½	33½	33	1,475
Union Copper	25	½	¼	½	...	...	...	...	...	½	...	½	1⅛	1,860
United Copper	100	...	...	...	...	...	...	...	...	6	...	...	...	100
Utah	1	...	...	...	...	...	...	...	...	.13	.12	...	...	700
White Knob.	10	1½	1	1½	1	1½	1	1½	1	1	...	1	...	4,420
Work	1	...	...	...	...	...	...	...	...	.08	...	.08	...	500
Yellow Jacket	1	...	...	.27	...	.26	25	...	...	...	...	...	...	1,000

Total sales, 491,877 shares.

SALT LAKE CITY.*

Oct. 8

Company.	Par Val	High.	Low.	Sales.	Company.	Par Val	High.	Low.	Sales.
Butler-Liberal		$ .09½	$ .09	11,000	May Day	$25	.14	.12½	50,655
Carisa	$ 1	.11	.10	5,350	N. Y. Bonanza	1	.02½	.02½	500
Century		.37	.36	300	Sacramento	5	.12½	.12½	4,500
Columbus Con.		1.37½	1.37½	400	Silver Shield		.04½	.04	26,525
Con. Mercur		.36	.35	900	Star Con.	1	.14½	.14	1,000
Daly-Judge	1	4.30	4.30	100	Sunshine		.28	.23½	4,400
Daly-West	20	14.00	13.25	1,155	Tetro	1	.01	.01	2,000
Grand Central	1	4.03½	4.02½	200	Uncle Sam Con.	1	.23½	.21	11,900
Lower Mammoth		.05	.05	200	Victoria		1.10	1.10	100
Mammoth		1.70	1.60	600	Victor Con.	1	.34½	.34	600

*By our Special Correspondent. Total sales, 122,385 shares.

BOSTON, MASS.

Company.	Par val.	Oct. 5 H.	Oct. 5 L.	Oct. 6 H.	Oct. 6 L.	Oct. 7 H.	Oct. 7 L.	Oct. 8 H.	Oct. 8 L.	Oct. 10 H.	Oct. 10 L.	Oct. 11 H.	Oct. 11 L.	Sales.
Adventure Con.	$25	4	3½	...	...	3½	...	4	...	4	...	4	3½	1,995
Alloues	25	13½	13½	13½	12½	12½	11½	11½	11½	13	12	13½	13	14,185
Amalgamated	100	61	59½	61½	60½	62½	61	62½	62½	63½	62½	63½	63	29,399
Am. Z. L. & Sm.	25	...	...	...	...	...	...	13½	12	13½	...	13½	13½	806
Anaconda	25	...	...	...	...	...	...	...	...	25	...	...	...	40
Arcadian	25	...	...	1	...	...	...	...	...	...	...	...	...	100
Arnold	25	25	...	.50	.30	.75	.35	.60	...	.60	.50	...	...	2,775
Atlantic	25	13½	13	13	...	13½	13	13	...	14	13	14½	14	3,142
Bingham Con.	50	28½	27	28½	27½	28½	28	28½	28½	28½	28	28½	28	6,985
Bonanza	10	...	...	...	...	.50	...	.55	.50	.50	...	...	...	1,075
Boston Con.	5	6½	...	6½	...	6½	...	6½	...	6½	...	6½	6½	1,420
Calumet & Hecla	25	520	...	...	...	520	...	525	...	555	530	560	540	419
Centennial	25	28½	27	27½	27½	28	27½	28½	28	28½	28	28½	27½	5,505
Central Oil	25	...	...	...	...	...	...	...	...	...	...	...	...	...
Con. Mercur	5	.40	...	.40	.35	.40	.38	.40	...	.38	...	.40	...	2,415
Continental Zinc	25	...	...	10½	...	...	...	...	...	...	...	...	...	50
Copper Range	100	58½	57½	58½	57½	58½	57½	59½	58½	61½	60	62	61½	31,596
Daly-West	20	14	13½	14½	14	14½	14½	14½	...	*15	14	14	13½	1,976
Dominion C.	100	59	58	55½	55	...	...	...	...	...	...	...	...	100
Dominion C. pf.	100	...	...	...	...	109½	...	...	...	...	...	...	...	5
Dominion I. & S.	100	...	...	14½	14	14	...	...	...	14½	...	14½	14	405
Elm River	12	...	...	...	...	2½	...	2½	2½	2½	...	2½	2½	445
Franklin	25	8½	8½	8½	8½	8½	...	8½	8½	8½	8½	9	8½	745
Granby Con.	10	3½	3½	3½	4	3½	3½	3½	3½	3½	...	4	3½	15,750
Guanajuato Con.	5	1½	1½	1½	...	1½	...	1½	...	1½	1½	...	...	2,200
Isle Royal Con.	25	22	20½	21	20½	20	20½	20	21½	20	22½	21½	20	8,049
Mass. Con.	25	4½	...	5½	4½	5½	5⅛	5½	...	5½	5½	5½	...	2,185
Mayflower	25	.50	...	...	...	...	...	...	...	...	...	...	...	100
Michigan	25	7½	7	7½	7	7½	6½	7½	7½	8½	7½	8½	8	3,153
Mohawk	25	48	...	47½	47	47½	47½	48½	47½	49	48½	48½	47½	3,939
Mont. Coal & C.	25	4⅝	4½	...	...	...	...	...	...	...	...	5½	5	3,550
Mont. & Boston.	5	1½	...	...	...	...	...	...	...	...	...	...	...	200
New Idria	5	...	...	...	...	...	...	...	...	...	...	...	...	...
Old Colony	25	...	...	...	...	...	...	1½	1	1	...	1	...	950
Old Dominion	25	20½	19½	20½	20½	21½	20½	22	21½	22½	21½	21½	21½	9,581
Osceola	25	83	81½	83½	82½	87	83½	90	87	91½	89	90½	89½	5,466
Parrot	10	24	...	25½	24½	25½	25	25½	25½	25½	25½	25½	25½	4,259
Phœnix Con.	25	...	...	2½	...	2	...	...	...	...	...	...	...	260
Quincy	25	91	...	91	90	91	90	92	91½	94½	90	94½	94	717
Rhode Island	25	...	...	1½	...	1	...	...	...	1½	...	1½	...	460
Santa Fe	10	1½	1⅛	1½	1½	1½	...	2	1½	2	...	2½	2	7,377
Shannon	10	6⅞	5	6½	5½	6	5½	6½	5½	6½	6	6½	6	36,125
Tamarack	25	...	...	115	...	119	116	128	119	126½	125	125	124	711
Trinity	25	8½	7½	8	7½	8	7½	8½	8	8½	8½	8½	8	5,977
Union C. L'd & Mg	25	...	...	...	...	...	...	...	...	...	...	2½	2½	390
United States.	10	21½	21	21½	20½	21½	21½	21½	21½	22	21½	22	21½	15,315
U.S.Coal & Oil.	25	11	...	11	10½	10½	10½	10½	...	10½	...	10½	10	1,340
Utah Con	5	41½	40½	41½	40½	41½	40½	41½	41	42½	41½	42½	42	16,331
Victoria	25	4½	4½	4	4	4½	4	4	...	4½	4½	4½	4	2,600
Winona	25	9	8½	...	...	...	...	9½	9	9½	9	9½	9	2,498
Wolverine	25	90	...	90	89½	92	89½	95	92½	96	95	96	95½	1,677
Wyandot	25	1½	1½	1½	1½	1½	1½	1⅝	1½	1½	...	1½	1	5,67

5

*Ex-dividend. †Assessment paid. Total sales, 261,418 shares.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Oct. 5 H.	Oct. 5 L.	Oct. 6 H.	Oct. 6 L.	Oct. 7 H.	Oct. 7 L.	Oct. 8 H.	Oct. 8 L.	Oct. 10 H.	Oct. 10 L.	Oct. 11 H.	Oct. 11 L.	Sales.
Allis-Chalmers	$100	...	...	...	...	...	...	...	...	...	...	...	...	...
Allis-Chalmers pf.	100	50	...	...	...	...	...	...	...	...	...	...	...	50
Am. Agri. Chem.	100	15½	...	...	...	...	...	...	...	...	...	...	...	10
Am. Agr.Chem.pf.	100	...	...	...	...	...	...	...	...	...	...	78	...	100
Am. Sm. & Ref.	100	67⅜	66½	67	65⅞	66½	65½	66½	66	66½	66	66½	66½	15,970
Preferred	100	108	106½	106½	106	107	106	...	...	107	106½	106½	...	4,100
†Cambria Iron	50	47	...	...	...	...	...	...	...	...	...	47	46½	244
†Cambria Steel	50	23⅜	23	23½	23	23	22⅞	23½	...	23½	22⅞	23	22⅞	8,825
Col. Fuel & Iron.	100	36½	35½	36½	35⅜	36½	35½	36½	36	37½	36	37⅜	36½	10,205
Col. & H. C. & I.	100	12½	12⅜	12½	...	12⅜	12½	...	...	12½	...	...	...	1,000
†Lehigh C. & N.	50	88½	88½	87½	87½	88	...	...	...	87½	...	88	87½	1,674
*Mong. R. Coal	50	...	...	...	...	...	...	...	...	...	...	8	...	125
*Mong. R. Coal pf.	50	24	...	24	...	24	...	...	...	23½	...	...	...	375
National Lead	100	25½	24½	24	22½	22½	21½	22½	22½	22½	22½	23	22½	16,826
Preferred	100	...	...	96	92	94	...	...	...	...	...	...	...	1,290
†Phila. Nat. Gas.	50	43½	42½	43⅜	43½	43	42½	43	42½	43	42½	43	42½	4,712
Preferred	50	45½	45	46	45½	45½	...	...	...	...	...	46	...	3,450
*Pittsburg Coal	100	...	...	...	...	16	15½	...	...	15½	...	15½	15½	135
Preferred	100	67½	66½	67⅜	67	67½	...	67½	67	68	67	68½	67½	1,952
Republic I. & S.	100	10½	10½	10½	10½	11½	10½	12½	11½	12½	12	12½	11½	21,590
Preferred	100	52½	51½	51½	51½	52	51½	51½	51½	...	...	52½	51½	13,270
Sloss-Shef. S. & I	100	41½	41	41½	41	41½	41	...	...	43½	41½	43	42½	4,950
Preferred	100	89½	...	89½	...	89½	...	...	...	...	...	...	...	550
Standard Oil	100	...	...	645	...	645	644½	644	...	643½	641½	645	...	79
Tenn. C. I. & R.R.	100	49½	48	49½	48½	49	48½	48½	...	51½	48½	51½	50½	42,460
U. S. Steel Corp	100	18½	18½	18½	17½	18½	17½	18½	18½	19½	18½	19½	18½	191,595
Preferred	100	75½	74	75½	74½	75½	74½	75½	74½	77½	75½	77½	76½	461,123
Va.-Car Chem.	100	35	34½	34	...	34½	34½	34½	34½	34½	33½	34½	34½	2,320
Preferred	100	107½	106½	107½	106½	107	106½	107½	107	107½	106½	107½	107	6,085

*Pittsburg Exchange; †Philadelphia Exchange; all others, New York Stock Exchange
Total sales, 815,065 shares ‡Ex-dividend.

STOCK QUOTATIONS.

SAN FRANCISCO.*

Company.	Location.	Sept. 29 H.	Sept. 29 L.	Sept. 30 H.	Sept. 30 L.	Oct. 1 H.	Oct. 1 L.	Oct. 3 H.	Oct. 3 L.	Oct. 4 H.	Oct. 4 L.	Oct. 5 H.	Oct. 5 L.	Sales.
MacNamara	Nev.	.38	.37	.36	.35	.39	.36	.40	.37	.40	.36	.37	.34	35,000
Mont. Tonopah	Nev.	1.90	1.85			182½	177½	1.80		1.80				2,650
Ton. Belmont	Nev.	.59	.57	.63	.60			.61				.63	.61	6,600
Ton. Midway	Nev.			.37						.38	.37	.43	.39	7,200
Ton. Mg. Co	Nev.			837½								837½	7.75	225
Ton. North Star	Nev.	.20	.19									.16	.15	10,100

*San Francisco & Tonopah Exchange, Total sales, 61,775 shares.

SAN FRANCISCO (By Telegraph.)

Company.	October. 10	October. 11	Company.	October. 10	October. 11
Belcher	$0.35	$0.33	Gould & Curry	$0.25	$0.21
Best & Belcher	1.35	1.20	Hale & Norcross	.65	.61
Caledonia	.50	.40	Mexican	1.35	1.30
Challenge Con.	.22	.23	Ophir	2.60	2.50
Chollar	.23	.22	Overman	.20	.45
Confidence	1.00	.95	Sierra Nevada	.40	.38
Con. California & Virginia	1.90	1.75	Union Con	.49	.45
Crown Point	.15	.14	Yellow Jacket	.25	.22

COLORADO SPRINGS (By Telegraph.)

Company.	Oct. 10 H.	Oct. 10 L.	Oct. 11 H.	Oct. 11 L.	Company.	Oct. 10 H.	Oct. 10 L.	Oct. 11 H.	Oct. 11 L.
Anaconda	.11½	.10	.11½	.10	Jack Pot	.05	.03		
C. K. & N	.24	.21	.22		Last Dollar	.25			
Cripple Ck. Con.			.09½	.09	Mollie Gibson	.04½			
Doctor Jack Pot	.04½	.04½			Moon Anchor	.07½		.07½	.07
Elkton Con	.63½	.62½	.63½	.62½	Old Gold	.10	.09½	.09½	.08
El Paso	1.13	1.11	1.14	1.13½	Pharmacist	.03½		.04	.03½
Gold Dollar	.06½	.06½	.06½	.06½	Portland	1.75	1.65	1.60	
Gold Sovereign	.06	.05½	.06½	.05½	Vindicator Con	.70	.65	.65	
Isabella	.19½	.19½	.20	.19½	Work	.08½	.08½	.08½	.08½

ST. LOUIS, MO.* Oct. 8

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid.	Ask.
Am. Nettie, Colo	$10	$0.17	$0.25	Columbia Lead, Mo.	$10	$0.25	$1.00
Catherine Lead, Mo	10	.50	1.00	Con. Coal, Ill	100	14.00	15.50
Central Coal & C	100	62.50	64.00	Doe Run Lead, Mo	100	110.00	115.00
Central C. & C., Pf	100	71.00	73.00	Granite Bimet., Mt.	10	.30	.40
Central Lead, Mo	100	110.00	117.00	St. Joe Lead, Mo	10	14.00	14.75

*By our Special Correspondent.

DULUTH, MINN. Sept. 24.

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid.	Ask.
Calumet & Arizona	$10	$95.00	$98.00	Lake Sup. & Pitts	$10	$45.00	$45.50
Calumet & Bisbee	10		2.00	Pitts. & Duluth Dev	15	58.00	60.00
Calumet & Pittsburg	10	38.00	39.50	Shakespeare	1		.20
Higgins Development	10		1.00	United Mexican	10		.50
Junction Development	15	35.00	35.50	Wolverine & Arizona	10		2.00

MONTREAL.* Oct. 4.

Company.	Par Val.	High	Low	Sales	Company.	Par Val.	High	Low	Sales
Dominion Coal	100	58.50	55.75	675	Montreal Steel	100	50.00	35.00	
Dom. Coal, Pf	100	110.50	109.50	37	Mont'l Steel, Pf	100	123.00	85.00	
Dom. I. & St	100	15.00	13.75	2,815	Nova Scotia St	100	69.25	66.00	782
Dom. I. & St., Pf.	100	43.50	41.25	675	N. S. Steel, Pf	100	107.00	105.50	50

*Montreal Stock Exchange. Total sales, 5,034 shares.

MEXICO. Sept. 30

Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.	Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO:				Soledad, aviada	$670	$990	$1,000
Ca. Min. de Penoles	2,500	$2,700	$3,200	Sorpresa, aviada	960	303	310
San Andres de la Sierra	200	10,000		MEXICO:			
GUANAJUATO:				Aldebarren	2,000	57	58
Cinco Senores y An. aviadoras	2,000	34	36	Buen Despacho	3,000	55	57
Cinco, Senores y An. aviada	400	34	36	Dos Estrellas	3,000	2,190	2,210
Providencia, San Juan de la Luz	6,000	58	65	La Esperanza (El Oro)	3,000	1,500	1,500
GUERRERO:				Santa Ana, Esperanza	2,400	15	30
Garduno y Anexas	7,200	35	40	NUEVO LEON:			
HIDALGO:				La Fraternal	1,000	580	620
Amistad y Con	9,600	73	74	Norias de Bajan	1,000	880	920
Carmen, aviada	1,100	140	160	SAN LUIS POTOSI:			
Guadalupe Fresnillo Mill	1,000	170	200	Concepcion y An	3,000	50	55
Guadalupe Fresnillo Mine	1,400	70	80	El Barreno, aviadora	2,000	86	90
Maravillas y An., aviador	1,680	100	130	Sta. Maria de la Paz	9,600	216	218
Maravillas el Lobo	1,000	130	180	ZACATECAS:			
Refugio, aviada	12,800	680	740	Asturiana y An	2,500	10	15
Sta. Gertrudis y An. aviadas	9,600	12	14	Candelaria y Pinos	2,500	44	50
Sta. Gertrudis y An. aviadora	28,800	76½	78	San Carlos y Anexas	2,500	45	55
San Rafael y An., Trompillo	1,200	1,950	1,970	Sta. Maria de Gaud	2,500	85	90
San Rafael y An., aviada	1,200	710	720	MISCELLANEOUS:			
				Bartolome de Medina	2,000	98	102
				Naica (Chihuahua)	100	11,000	13,000
				Natividad (Oxaca) aviadora	1,800	95	100
				San Francisco Hac.	6,000	95	100
				Union Hacienda	3,000	330	360

LONDON. Sept. 30

Company.	Shares Issued.	Par value. £	s.	d.	Latest dividend. Amt. s.	d.	Date.	Quotations. Buyers. £	s.	d.	Sellers. £	s.	d.
American:													
Alaska-Treadwell	200,000	5	0	0	2	0	July, 1904	4	12	6	4	17	6
Anaconda	1,200,000	5	0	0	2	0	May, 1904	4	13	9	4	16	3
Camp Bird	820,000	1	0	0		9	Aug., 1904	1	7	6	1	8	6
Copiapo	112,500	2	0	0	6	10	May, 1903	1	0	0	1	5	0
De Lamar	80,000	1	0	0	1	6	May, 1904		13	9		16	3
El Oro	1,080,000	1	0	0		9	July, 1904		17	6	1	0	0
Esperanza	455,000	1	0	0		6	Aug., 1904						
Frontino & Bolivia	128,662	1	0	0	3	0	July, 1901		8	6		9	6
Le Roi	200,000	5	0	0	5	0	Nov., 1899		13	9		16	3
Le Roi No. 2	120,000	5	0	0	1	0	June, 1904		10	0		12	6
Palmarejo & Mexican	445,000	1	0	0		rts.	Apr., 1903		8	9		9	3
Standard	500,000		4	0		2½	Sept., 1903		2	0		3	0
Stratton's Independence	1,000,007	1	0	0		6	Dec., 1903		2	3		2	9
St. John del Rey	546,265	1	0	0		6	Dec., 1903		12	6		13	9
Tomboy	300,000	1	0	0	1	0	June, 1902	1	0	0	1	5	0
Ymir	200,000	1	0	0	1	0	Mar., 1902		2	6		5	0
European:													
*Linares	15,000	3	0	0	5	0	Sept., 1904	3	10	0	4	0	0
Mason & Barry	185,172	1	0	0	7	0	May, 1904	2	15	0	3	0	0
Rio Tinto	325,000	5	0	0	37	6	May, 1904	56	12	6	56	17	6
Rio Tinto, preferred	325,000	5	0	0	2	6	May, 1904	6	0	0	6	5	0
Tharsis	625,000	2	0	0	7	0	May, 1904	4	10	0	4	15	0
West Australian:													
Associated	495,388	1	0	0	2	6	July, 1904	1	13	9	1	16	3
Cosmopolitan	400,000	1	0	0	1	0	Apr., 1904		7	0		7	6
Golden Horseshoe	300,000	5	0	0	6	0	Aug., 1904	6	0	0	6	2	6
*Great Boulder	1,750,000		2	0		9	Sept., 1904		19	3		19	9
Gt. Boulder Persever'ce	1,400,007	1	0	0	1	0	Sept., 1904		12	3		12	6
Great Fingall	250,000	1	0	0	7	0	Oct., 1904	7	12	6	7	15	0
Ivanhoe	200,000	5	0	0	5	0	Oct., 1904	7	3	9	7	6	3
Kalgurli	120,000	1	0	0	2	6	Oct., 1904	5	2	6	5	5	0
Lake View	250,000	1	0	0	1	6	Oct., 1904	1	3	9	1	6	3
*Oroya-Brownhill	450,000	1	0	0	3	0	Sept., 1904	3	6	3	3	8	9
Miscellaneous:													
Brilliant Central	100,000	1	0	0	1	0	Oct., 1904	2	0	0	2	5	0
Briseis	600,000	1	0	0					10	3		10	9
Broken Hill	960,000		8	0	1	0	Aug., 1904	1	19	6	2	0	6
Mt. Lyell	275,000	3	0	0	1	3	June, 1904		11	0		12	0
Mt. Morgan	1,000,000	1	0	0		3	Oct., 1904	2	3	9	2	6	3
Waihi	497,412	1	0	0	2	6	Sept., 1904	5	10	0	5	12	6
Indian:													
Champion Reef	513,832		10	0	1	4	Sept., 1904	1	11	0	1	12	0
Mysore	566,043		10	0	4	6	July, 1904	6	7	6	6	10	0
Nundydroog	484,000		10	0	1	3	July, 1904	1	16	0	1	17	0
Ooregum	343,000		10	0	1	3	Aug., 1904		16	3		17	6
Ooregum, pfd	240,000		10	0		4	Aug., 1904	1	5	0	1	7	6
South African:													
Angelo	600,000	1	0	0	7	0	Aug., 1904	6	15	0	6	17	6
Bonanza	200,000	1	0	0	8	0	Aug., 1904	1	1	3	1	3	9
British South Africa	4,436,019	1	0	0		rts.	May, 1899	1	9	9	1	11	3
Cape Copper	300,000	2	0	0	2	6	July, 1904	3	15	0	3	17	6
Cape Copper, pfd	75,000	2	0	0	2	6	July, 1904	3	12	6	3	17	6
City & Suburban	340,000	4	0	0	4	0	Aug., 1904	5	1	3	5	3	9
Consol. Gold-Fields	2,000,000	1	0	0				6	3	9	6	5	0
Crown Reef	120,000	1	0	0	9	0	Oct., 1904	14	15	0	15	5	0
De Beers, preferred	800,000	2	10	0	10	0	Aug., 1904	18	3	9	18	6	3
De Beers, deferred	1,000,000	2	10	0	12	6	Aug., 1904	18	12	6	18	15	0
East Rand	990,000	1	0	0	5	0	July, 1903	8	3	9	8	5	0
Ferreira	90,000	1	0	0	22	6	Aug., 1904	20	10	0	21	0	0
Geldenhuis	200,000	1	0	0	7	0	Aug., 1904	5	8	9	5	11	3
Geduld	400,000	1	0	0		rts.	Mar., 1902	6	7	6	6	8	9
Henry Nourse	125,000	1	0	0	8	0	Aug., 1904	7	17	6	8	2	6
Jubilee	50,000	1	0	0	5	0	Aug., 1904	4	12	6	4	17	6
Jumpers	100,000	1	0	0	2	6	May, 1904	2	7	6	2	12	6
Langlaagte	470,000	1	0	0	2	0	Aug., 1904	3	10	0	3	12	6
May	288,750	1	0	0	3	0	Aug., 1904	3	18	9	4	1	3
Meyer & Charlton	100,000	1	0	0	5	0	Aug., 1904	5	2	6	5	7	6
Modderfontein	290,000	1	0	0		rts.	Apr., 1902	8	13	9	8	16	3
Namaqua	94,331	2	0	0	3	0	Dec., 1903	2	17	6	3	2	6
New Jagersfontein	200,000	5	0	0	15	0	Oct., 1904	27	5	0	27	15	0
New Primrose	325,000	1	0	0	3	0	Aug., 1904	3	10	0	3	12	6
Rand	1,795,956		5	0	5	0	Aug., 1902	10	6	3	10	7	6
Robinson	750,000	5	0	0	6	0	Aug., 1904	9	2	6	9	7	6
Robinson Deep	950,000	1	0	0	3	0	Aug., 1904	5	5	0	5	7	6
Rose Deep	425,000	1	0	0	3	0	Aug., 1904	8	10	0	8	15	0
Salisbury	100,000	1	0	0	2	0	Sept., 1904	1	15	0	1	17	6
Village Main Reef	400,000	1	0	0	4	0	July, 1904	6	7	6	6	10	0
Wemmer	80,000	1	0	0	12	6	July, 1904	10	10	0	11	0	0

*Ex-dividend.

LONDON (By Cable).*

Company.	Oct. 5 £	s.	d.	Oct. 12 £	s.	d.	Company.	Oct. 5 £	s.	d.	Oct. 12 £	s.	d.
Camp Bird	1	8	3	1	8	0	Esperanza		17	0		16	3
Con. Gold Fields	6	7	6	6	8	9	Modderfontein	9	1	3	9	5	0
De Beers	18	15	0	18	10	0	Rand Mines	10	8	9	10	12	6
Dolores	1	5	0	1	5	3	Rio Tinto	57	5	0	57	10	0
East Rand	8	6	3	8	6	3	Simmer & Jack	1	15	0	1	15	0
El Oro		19	4½	1	0	0	Tomboy	1	1	3		19	4½

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Sept. 22.

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest dividend. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Anzin, Coal	France			290.00	5,725.00	5,710.00
Boleo, c	Lower Cal.	12,000,000	500	104.17	2,245.00	2,260.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	16.75	16.75
Courrieres, Coal	France	600,000	500	110.00	2,910.00	2,949.00
Fraser River, g	Brit. Col	250,000	25		5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	92.75	93.75
Laurium, z. l	Greece	16,300,000	500	25.00	309.00	309.00
Malfidano, z	Italy	12,500,000	500	50.00	625.00	630.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	510.00	505.00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	1,022.00	1,010.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	639.00	610.00
Penarroya, Coal	Spain		500	45.00	1,130.00	1,136.50
Vielle Montagne, z	Belgium	9,000,000	30	30.00	778.00	778.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. s—Silver. z—Zinc.